CHAPTER 1

ENVIRONMENTAL COMMUNICATIONS

INTRODUCTION

In the field of meteorology and oceanography, we depend heavily on information to do our jobs. We must collect raw observation reports and processed data, and both collect and disseminate forecast products. Today, we must rely heavily on computer systems to process information. Your responsibilities as an observer will include processing data received from various communications systems and retrieving environmental data for the forecaster. In addition, you will be asked to compose various types of message reports for transmission to other activities. Most of these tasks involve the use of computers and computer systems.

In this chapter, we begin with a brief discussion about communications security. We then take a look at several environmental communications systems, such as telephone systems, computer networks, and digital facsimile. Next, we discuss environmental computer workstations, naval message transmission networks, and voice radio systems. We complete the chapter with a discussion of environmental communications systems designed specifically for use aboard ship.

COMMUNICATIONS SECURITY

LEARNING OBJECTIVES: Identify the classification markings and special handling markings authorized for naval correspondence and message traffic. Identify the publication that outlines information and personnel security procedures for the Navy.

Environmental information, for the most part, is freely exchanged between countries of the world. Within the Navy and Marine Corps, some environmental information, if released to the wrong person or country, could threaten the defenses of the United Stated or our allies. This type of information must be classified according to Department of Defense and Department of the Navy security guidelines to prevent its unauthorized disclosure. Information evaluated for its impact on the defense of the United States is defined as either "unclassified" or "classified." *Unclassified* information has been evaluated, but disclosure of the information would not effect the security of the country. *Classified* information, if disclosed, could effect national security to some degree. Access restrictions are assigned to protect classified information.

The program to protect sensitive information and to prevent its intentional or inadvertent disclosure to other nations is discussed in depth in OPNAVINST 5510.1, *Department of the Navy Information and Personnel Security Program Regulation,* often called the *Security Manual.* The manual defines three general categories of classified information in increasing order of restriction: Confidential (C), Secret (S), and Top Secret (TS). Additionally, the *Security Manual* provides definitions and guidelines for handling both unclassified and classified information and information with special-handling markings.

The Naval Telecommunications Procedure--Three (NTP 3), Telecommunications Users Manual further explains the use of special-handling markings. Some of the most common include the following:

- *EFTO (Encrypt For Transmission Only):* Used to identify and protect messages during electrical transmission that do not meet the criteria for classification but have potential value if subjected to analysis.
- *FOUO (For Official Use Only):* Unclassified material not given a security classification, but for various reasons, may not be discussed or released to the public.
- *NATO RESTRICTED:* Information treated similar to FOUO with access only for official purposes to North Atlantic Treaty Organization (NATO) member nations.
- *ALLIED RESTRICTED:* Information so marked is treated as Confidential information when received by U.S. activities.
- *NOFORN or NF (NOt releasable to FOReign Nationals):* Classified material that may not be released to any foreign government, foreign national, or non-United States citizen, even if

that person is employed by the U.S. Government.

- *SPECAT (SPEcial CATegory):* Message traffic associated with a special project or subject, with access and handling limited to only those personnel designated in writing by the commanding officer.
- *LIMDIS (LIMited DIStribution):* Distribution within the receiving activity is limited only to those personnel with specific access and need-to-know.
- *PERSONAL FOR:* A classified or unclassified message with distribution limited only to the named recipient(s), normally commanding officers or flag officers.
- *WNINTEL:* This is a control marking that denotes "Warning Notice-Sensitive Intelligence Sources or Methods Involved." Classified intelligence so marked must not be disseminated in any manner outside of authorized channels without the permission of the originator.

All classified information or information that requires special handling must be clearly marked. Normally, printed pages are marked at the top and bottom with a stamp or large machine-printed letters. Classified words, subjects, or titles are marked at the end of the subject line in parentheses. Information within each paragraph or section of a narrative is identified with the security classification and special handling marking at the beginning of each paragraph or section. Figure 1-1 shows an example of these markings.

OPNAVINST 5510.1 also discusses requirements for granting a security clearance for access to classified information. Access to classified information is granted only on a "need-to-know" basis. You will only be granted access to classified information that is necessary to perform your assigned duties.

Within your command, the Security Officer maintains a list of all permanent party and visitor security clearances and levels of access. Classified information may not be discussed with anyone whose clearance and access level cannot be verified.

As we discuss communications systems in the next section, you will see that most of the environmental information is handled and stored on computers and automated systems. The Department of the Navy has instituted a special security program to protect automated information systems. Your activity has an Automatic Data Processing Security Officer (ADPSO) who is responsible for the security of all personal computers (PCs) and PC based data handling, data processing, and communication systems. The ADPSO is also responsible for the security of other ADP systems, such as the Tactical Environmental Support System (TESS). The ADPSO will provide special security training for personnel that use automated systems as well as control access to these systems.

SECRET-NOFORN

Subj: THIS IS AN EXAMPLE OF A CONFIDENTIAL NOFORN SUBJECT (C-NF)

Ref: (a) This is an example of an unclassified reference used in a classified message or other correspondence (U)

(b) This is an example of a confidential reference title (C)

1. (C) This is an example of a confidential paragraph within a narrative.

2. (U) The second paragraph in this example is unclassified. The (U) only precedes a paragraph of unclassified information in a document containing classified information.

3. (S-NF) This is an example of a secret, no forn paragraph. The entire document must be classified equal to the highest classification and strictest special handling markings of any material contained within the document.

S E C R E T - NOFORN

(SECURITY MARKINGS FOR ILLUSTRATIVE PURPOSES ONLY)

Figure 1-1.—Example of security markings in a Naval message.

REVIEW QUESTIONS

Q1. Which publication governs security procedures for the United States Navy?

Q2. What does the special-handling marking "FOUO" indicate?

Q3. What does the special-handling marking "NOFORN" indicate?

The area of telecommunications is the most rapidly changing aspect of environmental support. Since many changes will continue to occur in the future, the remainder of this chapter will only summarize the basic components of the most widely used communications systems.

TELECOMMUNICATIONS SYSTEMS

LEARNING OBJECTIVES: Identify the various telecommunications equipment and systems used to transfer environmental information. Discuss general procedures used to transfer data on these systems.

Navy and Marine Corps weather personnel will use many different telecommunications systems to exchange environmental information. These systems make use of dedicated landline, radio wave, and satellite communications technology. The following telecommunications systems are discussed in this section:

- Telephone systems
- Computer networks
- Dedicated meteorological communications systems
- Digital facsimile systems

TELEPHONE COMMUNICATIONS SYSTEMS

Commercial telephone systems and the Defense Switched Network (DSN) in military communications, especially in the field of meteorology and oceanography, are the most common forms of communication for official business ashore.

Navy and Marine Corps activities may provide environmental information to any Department of Defense activity. However, there are restrictions on the type of information that may be provided to other government agencies, private companies, and to the public. Usually, a written request for information must be approved by the commanding officer before any information may be transferred. All non-routine requests for weather forecasts should be referred to the duty forecaster.

When answering the telephone, always speak clearly. In a standard military telephone greeting, first identify your command, then your rank and last name. Then ask, "May I help you, Sir/or Madam?" Your activity may use a slight modification to this greeting. The caller should identify him/herself by name, rank, and command before proceeding with the conversation. Never discuss, or allow the caller to discuss, classified information on a standard telephone. Use telephone conversation memo pads or record sheets to document the details of a telephone conversation.

When placing a telephone call, think about what you want to say before you dial the phone. Organize your thoughts to allow your phone call to be as brief as possible. Unless you are transmitting data, your call should be limited to 10 minutes or less.

Telephone System Access

Normally, you can access the local commercial network, a commercial long-distance network, and the Defense Switched Network (DSN) from the telephone instrument provided with the local base telephone system. Many Navy and Marine Corps stations are supported by a customized telephone system that allows on-base calls to be made by dialing only four- or five-digit numbers. Other networks are accessed by dialing a one- or two-digit access code.

Complete instructions on the use of your local telephone system and how to access other available systems is normally provided in your base telephone book. Your command will also provide additional guidance on the use of the telephone. This guidance is usually found in a station instruction or in your command's standard operating procedures (SOPs).

COMMERCIAL LONG-DISTANCE SERVICE.—Commercial long-distance telephone service is available on all government telephone networks. Your command must pay for all commercial long-distance services. Virtually all military activities require that a long-distance phone call record slip or log entry be completed by the person placing the call. Some commands require specific authorization for each long-distance call before the call can be placed.

Government telephones are intended for official business only. Most commands permit limited, brief, local telephone calls to be made to take care of personal matters that cannot be conducted during off-duty hours. However, the use of commercial long-distance services for personal business is prohibited and is always investigated. Detailed records of every commercial long-distance call (telephone bills) are forwarded monthly to each command for verification with the long-distance phone call records.

DEFENSE SWITCHED NETWORK.—The Defense Switched Network (DSN) is a telephone network servicing most military installations in the continental United States and overseas. This system is an upgraded, all-digital network that has replaced the former Automatic Voice Network (AUTOVON). The DSN incorporates many special features, such as automatic callback, call forwarding, call transfer, and call waiting. Instructions for use of the service and special options are included in the *DSN User Services Guide,* DISA Circular 310-225-1.

All telephone connections on the DSN are connected and maintained on a precedence basis (see table 1-1). Low precedence calls are initially connected only if there are free circuits available between the caller and the destination. Higher precedence calls may initially be connected even if all circuits are in use by a process called "preemption." When no free circuits are found, the computer checks the precedence on calls in progress. A lower precedence call in progress will be terminated by the system to allow a higher precedence call to proceed. The calling parties of the lower precedence call hear a brief high-pitched tone on the line just before the line goes dead to indicate that their call has been preempted. The effectiveness of this system depends on the proper use of the precedence system. Each user should ensure that his or her call is not assigned a precedence higher than that justified by the circumstance or information involved.

Local command policy normally states that the DSN is to be used for official calls only. Personal or unofficial calls must never be initiated into the DSN system.

Telephone circuits, particularly those routed by high frequency and microwave, are susceptible to monitoring and interception. **The DSN is not a secure system!** Users must take care and use common sense to avoid divulging classified information. Giving hints or talking "around" a classified subject can lead to the compromise of classified information.

Table 1-1.—DSN Telephone Network Precedence System

PRECEDENCE	DESCRIPTION
FLASH OVERRIDE (FO)	Takes precedence over and preempts all calls on the DSN and is not preemptible. FO is reserved for the President of the United States, Secretary of Defense, Chairman of the Joint Chiefs of Staff, chiefs of military services, and others as specified by the President .
FLASH (F)	Preempts lower precedence calls and can be preempted by FLASH OVERRIDE only. Some of the uses for FLASH are initial enemy contact, major strategic decisions of great urgency, and presidential action notices essential to national survival during attack or pre-attack conditions.
IMMEDIATE (O)	Preempts PRIORITY and ROUTINE calls and is reserved for calls pertaining to situations that gravely affect the security of the United States. Examples of IMMEDIATE calls are enemy contact, intelligence reports essential to national security, widespread civil disturbance, and vital information concerning aircraft, spacecraft, or missile operations.
PRIORITY (P)	Preempts only ROUTINE calls. For calls requiring expeditious action or furnishing essential information for the conduct of government operations. Examples of PRIORITY calls are intelligence reports, movement of naval, air, and ground forces, and important information concerning administrative military support functions.
ROUTINE (R)	For official government communications that require rapid transmission by telephone. These calls do not require preferential handling.

Telephone Equipment

Most weather offices are equipped with multi-line telephones to handle normal business. Multi-line telephones contain six or more buttons in addition to the normal keypad. Depressing a button will switch the telephone to the number shown by the lighted button. Incoming calls activate a flashing light corresponding to the number of the incoming call. Normally, these telephones are on unprotected circuits, and classified information may not be discussed.

Additionally, *secure* telephones are found in many offices, and just about every weather activity has at least one telephone facsimile send and receive terminal.

SECURE TELEPHONE.—The Secure Telephone Unit-Third Generation (STU-III) is a communications system that meets the need for the protection of vital and sensitive information over a telephone system. The STU-III is a compact, self-contained, desktop unit capable of providing the user with both clear as well as secure voice and data transmissions (fig. 1-2). The STU-III is unique in that it works as an ordinary telephone and as a secure telephone network to other STU-III terminals. STU-III equipment may be used to provide secure communications on all commercial and military telephone networks. Full feature STU-III telephone terminals are equipped with modems that also allow clear and secure data transfer. However, some telephone networks do not provide the high-quality, low-noise circuits necessary for data transmission.

The STU-III is operated the same way as any regular telephone. That is, you pick up the handset, wait for a dial tone, and then dial the number of the person you want to call. Calls on the STU-III are always initiated in the clear voice mode. Once the party you have called (at another STU-III terminal) has answered, you have the option of talking to that person in the clear voice or secure voice mode.

The STU-III terminal uses special keys with a designator of KSD-64A. The KSD-64A is a plastic device that resembles an ordinary key. Two types of KSD-64A keys are used with the STU-III, the seed key and the crypto ignition key (CIK). The seed key is special keying material used for the initial electronic setup of the terminal. The CIK is used by the operator to activate the secure mode. CIKs work only on the STU-III that they are issued with, and are unusable on all other terminals. More than one CIK may be issued with a terminal.

Calls are always initiated in the clear voice mode, exactly the same as a normal telephone call. For users to go from clear to secure voice transmission, both the calling and the receiving STU-III terminals must have the CIK inserted and turned a quarter turn clockwise. Then either caller may initiate the secure mode by pressing the "SECURE" button. Once a secure link has been initiated, the two STU-III terminals begin

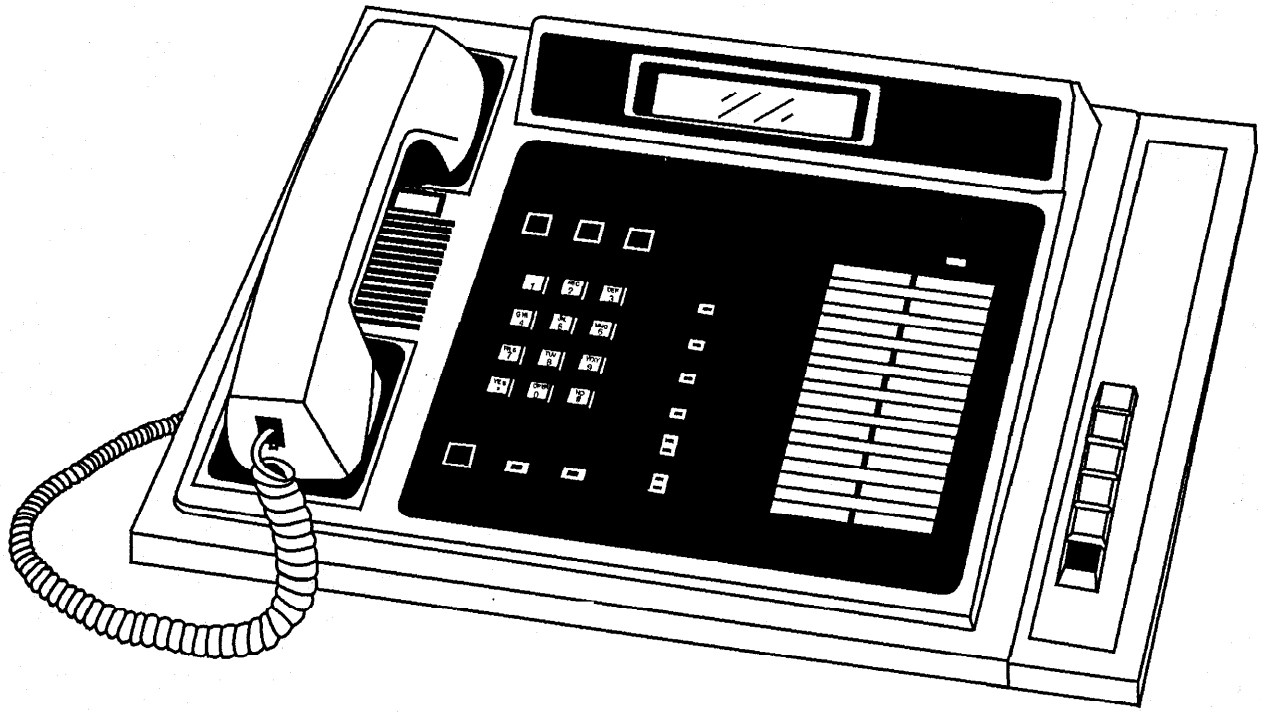

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Figure 1-2.—STU-III terminal.

exchanging information. When two terminals communicate in the secure mode, each terminal automatically displays the authentication (identification) information of the distant terminal, and a list of compromised CIKs. This information is scrolled through the display window during secure call setup. The first line of the identification information and the classification level are displayed for the duration of the secure call. The information displayed indicates the approved classification level for the call, but does not authenticate the person using the terminal. The terminal users are responsible for viewing this information to identify the distant party and the maximum security classification level authorized for the call.

Secure data transmissions using STU-IIIs may be made by connecting a computer modem phone plug into the MODEM plug receptacle on the backside of the unit, and then activating the "SECURE DATA" mode.

The STU-III terminals and keys are Communications Security (COMSEC) material and require special handling. The terminals and keys are administered through the STU-III COMSEC Account (SCA) Custodian. Both the terminals and keys that are issued to users must be signed for. Since the seed key is classified, it must be afforded protection in accordance with *Secure Telephone Unit Third Generation STU-III COMSEC Material Management Manual,* CMS 6. Although unkeyed STU-III terminals may be carried on mobile operations or exercises, the seed key is never transported, and the CIK key must be transported separately from the STU-III unit.

Because CIKs permit the STU-III terminals to be used in the secure mode, the CIKs must be protected against unauthorized access and use. CIKs may be retained by the users who sign for them on local custody. Users must take precautions to prevent unauthorized access and must remember to remove the CIKs from the associated terminals.

When the terminal is unkeyed, it must be provided the same protection as any high-value government item, such as a personal computer. When the terminal is keyed, the terminal assumes the highest classification of the key stored within it and must be protected in accordance with the classification of that key.

TELEFAX.—Nearly every command uses automatic telephone facsimile (telefax or fax) send and receive terminals to transfer graphic and written environmental information. This equipment may be used to transfer unclassified information only. Figure 1-3 shows an example of a pregummed 1.5-inch by 4-inch label containing certain information that should be included on every telefax. Some commands use a pre-printed cover-page containing this information.

# OF PAGES:	FROM
TO:	COMMAND:
COMMAND:	OFFICE CODE:
OFFICE CODE:	PHONE #:
FAX #:	FAX #:

Figure 1-3.—Example of a telefax address label.

Operation of telefax equipment is usually very simple. You place the original information on the feed tray, dial the destination fax number on the key pad or on the attached telephone instrument, and press the "send" key when a high pitched tone is heard in the receiver. Detailed instructions are normally attached to each terminal. The receive mode is fully automatic.

TELEPHONE MODEMS.—Telephone modems are electronic equipment that allow computers to transmit data directly over telephone circuits. Modems are also used to connect desktop computers to Local Area Networks (LANs) or to Wide Area Networks (WANs). There are many different modems in use throughout the Naval Meteorology and Oceanography Command. Most desktop computers now contain a built-m modem.

Modems are controlled via the computer with a special type of software program called a *communications protocol program.* These programs allow the operator to specify the telephone number to be accessed and to specify various communications parameters for the transmitted signal. It is beyond the scope of this training module to discuss the operating procedures for the various protocol programs or communications parameters. Operating instructions for each program are included with the program manual issued with the software. Specific protocol parameters allow the user to access programs such as NODDS.

The *Naval Meteorology and Oceanography Command Telephone and Address Listing* contains addresses, telephone numbers, and telefax numbers for all Naval Meteorology and Oceanography Command activities, Marine Corps weather activities, and offices of other military activities associated with meteorology and oceanography *(METOC)* support. Your Leading Chief usually maintains the directory and may provide copies at key telephone locations throughout your activity.

COMPUTER NETWORKS

The latest and fastest growing method of disseminating environmental information is through the use of computer networks. The advent of the information revolution has brought dramatic changes to the METOC community. Aerographer's Mates must now be proficient in accessing and transferring information in an automated environment. Almost all METOC activities, including those aboard ship, have access to some type of computer network.

A computer network consists of two or more computers connected for the purpose of exchanging messages and sharing data and system resources. A *local area network* (LAN) connects personal computers and workstations (each called a node) over dedicated, private communications links. A *wide area network* (WAN) connects large numbers of computers (nodes) over long distance communications links, such as common carrier telephone lines. An *internet* is a connection between networks.

The Internet

The Internet is a WAN that connects thousands of different networks all over the world, enabling anyone with a computer and Internet access to transmit and retrieve information worldwide. The Internet is not owned or funded by any one institution, organization, or government. It was originally developed by the Department of Defense in the late 1960's as a reliable communications network that, because of its simple design and versatility, could survive a nuclear attack. Gradually, other government agencies, universities, and scientific organizations began to tap into the network. By 1983, newer networking protocols were developed, laying the foundation of the Internet we use today.

The development of Hypertext Markup Language (HTML) in 1990 significantly increased speed and capacity, and enabled users to transmit *graphical* information over the Internet for the first time. As an additional feature, HTML created the ability to insert hypertext *links* into a document. Hypertext links allow a user to load another document into their computer simply by clicking on an on-screen "link" from the current document. Subsequently, a huge hypertext network known as the World Wide Web (WWW) came into being in 1992. These developments enabled any individual or organization to create their own "website", and thus disseminate information over the Internet. Each website normally has an index or introductory document commonly referred to as a "homepage."

The Internet consists of several networks linked together via Internet Service Providers (ISPs) that use high-speed digital and fiber optic circuits. Each computer (client) must be connected to an Internet hub, known as a sewer. Servers are fast computers that are connected to the Internet full-time. They are located at different sites throughout the world, and direct Internet traffic to its proper destination. Today, the term "Internet" is used to refer to the physical structure of the Net, including client and server computers and the lines that connect them (fig. 1-4). The term "World Wide

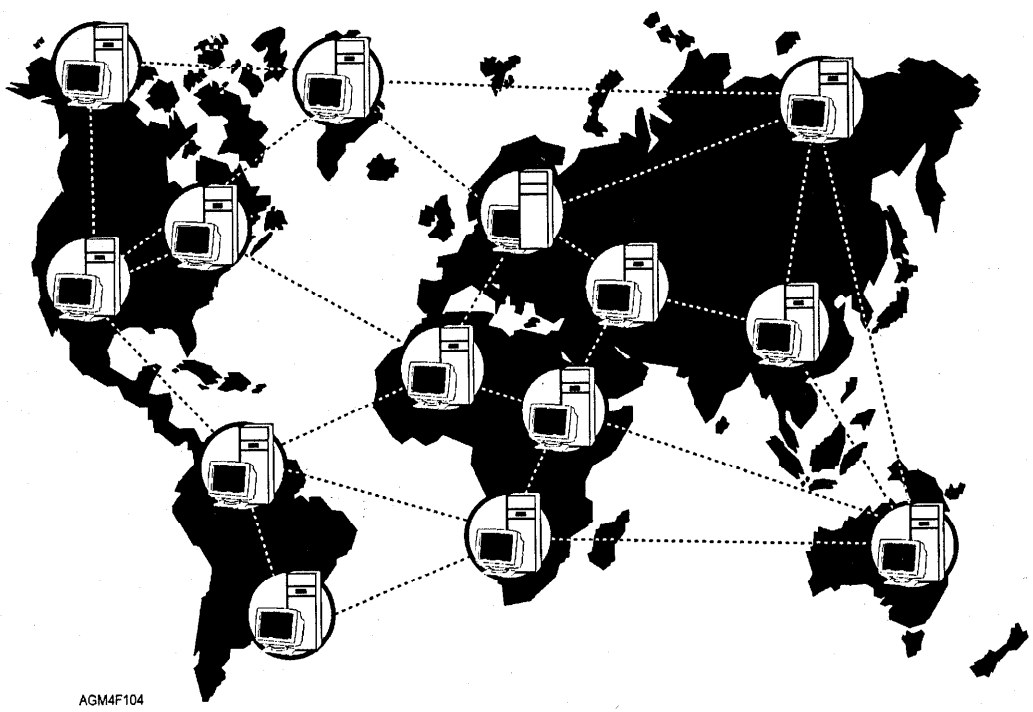


Figure 1-4.—The Internet.

Web" or "Web" is generally used to refer to the collection of sites and the information that can be accessed from them when using the Internet.

There are several layers of the World Wide Web. These layers include networks operated by commercial enterprises, private organizations, universities, the government, and the military (fig. 1-5). Each network contains thousands of individual websites that reside on web servers. The governing body of the Internet is an international organization known as InterNIC; it is

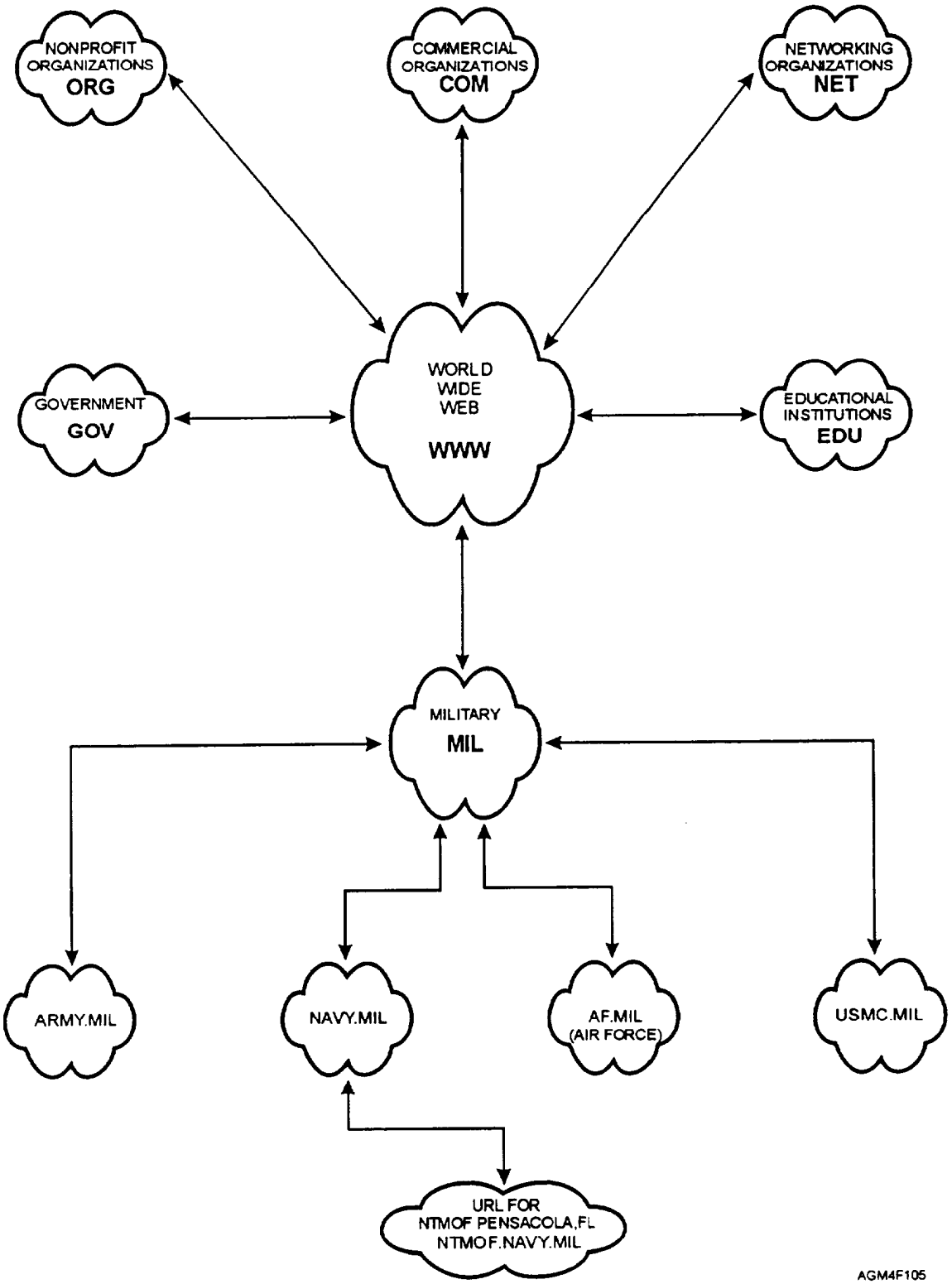


Figure 1-5.—Various layers of the Internet.

located in Herndon, Virginia. InterNIC controls all Internet addresses and naming conventions.

Each website is identified by an address indicator known as a Uniform Resource Locator (URL). The URL is a unique alphanumeric code that allows you to quickly locate and access a specific website. A typical URL might read: http://www.weather.edu. The first part of the URL indicates the type of Internet protocol your computer must use. In this case, http:// (hypertext transfer protocol), is used. The second part of the URL represents the name of the web server (www) followed by the website's domain (weather.edu). Most URLs end with an extension identifier that is used to access a particular network domain, such as .edu (educational institutions), .com (commercial websites), and .mil (military websites).

Websites can be easily accessed by using commercial software known as a *web browser.* As soon as you type in the URL of the website you wish to access, your browser goes to the web server that holds the page and retrieves it. If a specific website address is unknown, there are Internet search *engines* that can be used to rapidly locate websites pertaining to a particular area of interest. For example, a keyword such as "aircraft," or a more specific term, such as "F-14 Tomcat," may be used to easily locate information concerning that topic.

A wealth of information is available via the Internet. But keep in mind that since any individual or organization can develop their own website, not all the information is accurate or reliable. Also, keep in mind that the Internet is not a secure telecommunications network.

Military Networks

The U.S. military operates its own environment on the Internet that provides more security than commercial methods. This environment, known as the Defense Information Systems Network (DISN), is managed by the Defense Information Services Agency (DISA). It consists of two primary networks, the *NIPRNET* (Nonsecure Internet Protocol Routing Network) and the *SIPRNET* (Secure Internet Protocol Routing Network). These networks require special dedicated circuits as directed by higher authority. Most Navy and Marine Corps METOC activities have NIPRNET access, and many also have SIPRNET access. In addition, almost all METOC activities, including most ships, maintain their own website (or homepage). Each of these websites may contain information on command history and mission, as well as provide access to various environmental products. Figure 1-6 is an example of the Naval Training Meteorology and Oceanography Facility (NTMOF), Pensacola, Internet homepage.

A tremendous amount of environmental information can be downloaded from various METOC activities. The NIPRNET and SIPRNET can be used to access environmental data from the website at the Fleet Numerical Meteorology and Oceanography Center (FNMOC), Monterey, California, including Navy Oceanographic Data Distribution System (NODDS) products and products from the Joint METOC Viewer (JMV). User manuals for NODDS, JMV, and other software programs can also be downloaded via the FNMOC website. In addition, there are several nonmilitary and nongovernment websites that contain valuable environmental information, which include looped satellite images, current weather maps, climatological data, and so forth. Many METOC websites include links to other sites with related information. Table 1-2 contains a listing of some of the most frequently accessed METOC-related websites.

Bulletin Board Systems

There are still a few environmental software programs that are available via bulletin board systems. Bulletin board services are acquired by dialing a telephone number for access to government computer networks. All government bulletin board services, including NODDS, require user identification codes and passwords. These are provided along with detailed operating instructions for all registered system users. All user identification codes and passwords must be protected and should never be disclosed to unauthorized users. Once user identification and passwords have been entered, your computer will be connected to the bulletin board system.

Electronic Mail

Electronic mail or e-mail is the electronic transmission of messages, letters, documents, and other materials via a communications network, such as the Internet. It allows computer-based messages to be electronically edited, replied to, or pasted into another electronic document. Most e-mail allows messages to be sent to multiple recipients. E-mail may even contain graphics, sound, and video attachments. Messages or files are sent to "accounts" or *electronic mail addresses.* An e-mail address is a unique identifier that is used to

Naval Training Meteorology and Oceanography Facility Pensacola, FL

YOU HAVE JUST ENGAGED AN OFFICIAL UNITED STATES NAVY WEB INFORMATION SERVICE

DOD Warning Statement Privacy and Security Notice General Disclaimer

METOC Products

Pascagoula Support

About NTMOF

Fleet Training Department

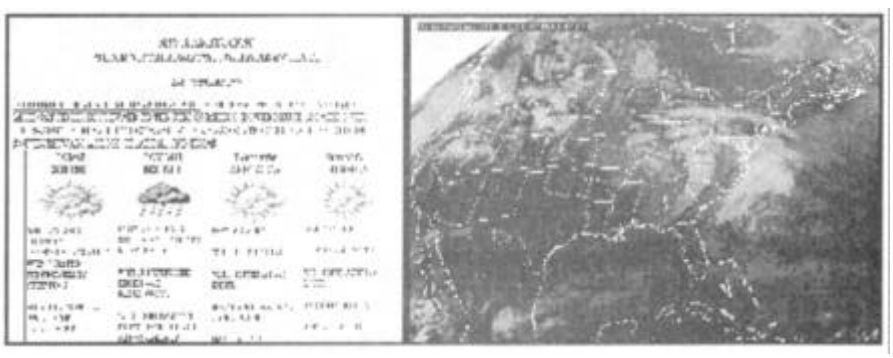
Feedback, Products request

Forecast Duty Officer:
DSN 922-3644
COM 850-452-3644

Mail to NTMOF WebMaster c/o
cdontmof@ntmof.navy.mil

Command Mission

To provide within areas of responsibility (AOR), as assigned by the Commander, Naval Meteorology and Oceanography Command, operational meteorology and oceanography (METOC) services to the Armed Forces of the Department of Defense (DoD).



Click Here for Todays Forecast Click Here for the Latest Satellite Picture

Figure 1-6.—NTMOF Pensacola Internet homepage.

send electronic mail to a specified destination. The recipient can be on the same server as the sender or on a server halfway across the world. The only restriction is that you must know the address of the person you wish to send e-mail to. An e-mail address usually appears as a user name, followed by an @ symbol, followed by the host name of the destination computer, such as "doe@acme.com. The addresses are normally case sensitive, and the spelling of the surname and of the site must be exact, or the message will not arrive at the recipient's computer.

WEATHER COMMUNICATIONS NETWORKS

There are several telecommunication networks dedicated solely to environmental information. The largest is the DOD Global Weather Communications System (GWCS). It is operated by the U.S. Air Force and provides rapid transmission of aviation weather support information to military facilities. The system includes the Automated Weather Network (AWN) and the Air Force Global Weather Intercept Program (GWIP) network.

Table 1-2.—METOC Related Websites

ORGANIZATION	WEBSITE URL
CNMOC Stennis Space Center	www.cnmoc.navy.mil
NAVO Stennis Space Center	www.navo.navy.mil
FNMOC Monterey, CA.	www.fnmoc.navy.mil
NLMOC Norfolk, VA.	www.nlmoc.navy.mil
NPMOC Pearl Harbor, HI.	www.npmoc.navy.mil
NPMOCW Guam	www.npmocw.navy.mil
NEMOC Rota, Spain	www.nemoc.navy.mil
NEPRF Monterey, CA.	www.neprf.navy.mil
NTMOF Pensacola, FL	www.ntmof.navy.mil
FNMOD Asheville, NC	waves.ncdc.noaa.gov/temp/fnmod.htm
FNMOD Tinker AFB	www.fhmoc.navy.mil/~tinker
AFWA Offutt AFB, NE	afwin.afwa.af.mil:443
NWS Climatic Data	tgsv5.nws.noaa.gov/climate.shtml
NWS Eastern Region	tgsv5.nws.noaa.gov/er/hq/index.html
NWS Southern Region	www.srh.noaa.gov
NWS Western Region	www.wrh.noaa.gov/wrhg
NWS Pacific Region	tgsv5.nws.noaa.govlprlpacific.shtml
NWS Alaska Region	www.alaska.netf-nwsar/
Weather Channel	www.weather.com
John Hopkins University	www.jhuapl.edu/weather
University of Wisconsin	www.meteor.wisc.edu/weather.html
Penn State University	www.psu.edu/weather
University of Michigan	cirrus.sprl.umich.edu/wxnet

Automated Weather Network

The AWN is a global network of satellite and landline circuits linked with Automated Weather Data Switch (AWDS) computers used to collect and disseminate environmental data and other aviation related information. The military segment of the AWN is composed of two major subsystems: the Air Force Meteorological Data System (AFMEDS), and the Notice to Airmen (NOTAM) service for all DOD activities. The center of the network is a computer complex at Tinker AFB, Oklahoma. These computers collect large quantities of unclassified environmental observations, forecast bulletins, and specialized guidance products from a variety of sources, including the National Weather Service (NWS), the Air Force Weather Agency (AFWA) at Offutt AFB, Nebraska, and the Fleet Numerical Meteorology and Oceanography Center. International environmental information is forwarded from the World Meteorological Organization (WMO) data collection center via the NWS and is also collected and entered into the AWN through the GWIP network.

The Fleet Numerical Meteorological and Oceanography Detachment (FNMOD) at Tinker AFB, Oklahoma, is responsible for coordinating and validating Navy and Marine Corps environmental data requirements for the AWN. They also manage and schedule Navy data requirements on the Fleet

Environmental Broadcast circuits that are keyed to the AWN. FNMOD Tinker also provides guidance on AWN data formats and can assist with preparing request messages for AWN products. Detailed information on the AWN can be obtained from the FNMOD Tinker homepage at http://www.fnmoc.navy.mil/~tinker/.

AFMEDS.—The data network used to support Air Force, Navy, and Marine Corps meteorological facilities within the United States is called the *Continental United States (COWS) Meteorological Data System,* or *COMEDS.* In the early 1970's, the service was expanded to include the *European Meteorological Data System (EURMEDS),* the *Pacific Meteorological Data System (PACMEDS),* the *Atlantic Meteorological Data System (ALTMEDS),* and an *Alaskan Meteorological Data System (AKMEDS).* These services are subsystems of the *Air Force Meteorological Data System,* or *AFMEDS.* Most of these dedicated landline circuits will be phased out by early next century as the NIPRNET becomes the primary method of transmitting AWN data. Software known as the Message Format Transmitter (MFT) module will be incorporated into the Meteorological and Oceanographic (METOC) Interactive Data Display System (MIDDS) to complete this changeover. However, the actual AWN data formats will not change. Ships will continue to receive AWN data via the Fleet Environmental Broadcast, which is discussed later in the chapter.

ARQ Requests.—Incoming environmental information is stored in the AWN computers in files identified with a MANOP heading. (MANOP headings will be discussed in more detail shortly). As each observation or product is received in the computer, the data is forwarded to all units that have listed that particular MANOP as part of their data requirements. Additionally, any activity connected to the system may request individual products that are not on their data requirements list by a process called *Automatic Response to Query,* or ARQ. Individual activities may also use the system to transfer specific support products from a forecast activity, such as a detachment, to any other activity on the system.

MANOP Headings.—The use of MANOP headings is the key to data retrieval from the system. MANOP headings conform to WMO product identification guidelines as well as to the International Civil Aviation Organization (ICAO) guidelines for station identification. Every MANOP must follow the general format

TTAA(ii) CCCC YYGGgg (mod)

where

TT is the data content identifier—a two-letter code for the type of data contained in the bulletin or message;

AA is the Geographical designator—a two-letter code for the region covered by the data in the bulletin or message;

ii is a two-digit series number assigned to products containing similar data for similar areas, and issued by the same originating station;

CCCC is the four-letter ICAO station identifier for the station originating or compiling the information in the bulletin;

YYGGgg is the UTC date-time group (DTG) of the information within the bulletin or message, with *YY* as the day, GG as the hour, and gg as the minutes; and

Mod is a modification indicator-an abbreviation showing that a change has occurred in an otherwise routinely scheduled message. Mod indicators are "RTD" (routine delayed) and "COR" (correction).

Each product entered in the system must contain the proper MANOP header before being entered into the system. However, transmissions of some routine products, such as standard military station weather observations and terminal aerodrome forecasts (TAFs) are normally sent through the system without MANOPs. Instead, they are grouped into a collective by the system, and then assigned a MANOP by the AWN computer.

Appendix II provides a breakdown of the various MANOP data type identifiers (*TT*) and geographical designators (*AA*) used within the system. A complete listing of available data in the AWN system can be obtained from the AFWA Detachment 7, Tinker AFB website: http://137.240.101.95, and the FNMOD Tinker website.

NOTAMS.—The AWN also provides communications for the worldwide military NOTAM system. The Air Force Central NOTAM Facility (AFCNF) in Washington, D.C. collects and retransmits NOTAMs from all military airfields as well as civil aviation NOTAMs from the FAA NOTAM facility in Atlanta, Georgia. NOTAMs report items of interest to

aviators, such as temporary or permanent runway closures, radar, communications, or guidance systems outages, or changes in available facilities at an airfield. At most military airfields, NOTAMs are directed to a separate AWN terminal in the base operation office. During terminal outages, these NOTAMs may be redirected to the AWN terminal in the weather spaces. Navy and Marine Corps weather observers should coordinate directly with the local base air traffic controllers to arrange for pickup of NOTAMs when received over a weather circuit.

Air Force Global Weather Intercept Program

The Air Force Global Weather Intercept Program (GWIP) is another major function of the GWCS. Air Force radio intercept sites around the world routinely intercept meteorological and oceanographic information broadcast from other nations that would otherwise be unavailable for use. This information is transmitted by other nations knowing that it will be intercepted and used. This is part of the data exchange program governed by the World Meteorological Organization data exchange agreements. The intercepted data is entered into the AWN, and large amounts are forwarded to the National Weather Service and FNMOC to supplement foreign data received from other sources. Most of the data is used for automated global scale analysis programs. Some selected data is directed to the Fleet Environmental Broadcast, which is discussed later in this chapter.

DIGITAL FACSIMILE

Several shore sites receive the National Weather Service Digital Facsimile (DIFAX) satellite broadcast. The broadcast originates at the National Centers for Environmental Prediction (NCEP) located at Camp Springs, Maryland, and it is then distributed via a continuous satellite broadcast from the National Weather Service office at Silver Spring, Maryland. A small 18-inch dish antenna is used to capture the broadcast signal at each receiver site.

The MIDDS is equipped with a special receiver module that can ingest DIFAX products as necessary. A few weather offices still use a desktop computer to analyze the signal and print the graphic products on a standard printer. No operator maintenance is required for the equipment other than periodically reloading paper, replacement of printer ribbons, and a periodic vacuuming of lint and dust from the printer.

The DIFAX uses product codes for each product. Operators access the command function via the computer keyboard, and use the product codes to specify which products are to be displayed or printed, and which products are to be ignored. The product codes are included on the facsimile transmission schedule. Transmission schedules are periodically broadcast and are also available via the Internet from the DIFAX service offices at NCEP.

The DIFAX broadcast should be discontinued by late 1999 as the NWS Advanced Weather Interactive Processing System (AWIPS) becomes fully operational. Most products currently available from this service and routinely used by military weather personnel are now available via NODDS and JMV.

So far, we have covered the various telecommunications systems you will use in the Navy. In the next section, we will discuss how you will access this information.

REVIEW QUESTIONS

Q4. Before a long distance commercial call can be made from a government telephone system, what action must be completed?

Q5. What is the purpose of the STU-III?

Q6. What are Internet "links" used for?

Q7. What is the function of a network server?

Q8. How are military URLs identified?

Q9. What Internet routing system is used to transfer classified information between military activities?

Q10. What types of information may be obtained from a METOC-related military website?

Q11. What information must be included in an e-mail address?

Q12. What is the purpose of the AWN?

Q13. What organization is responsible for coordinating and validating Navy and Marine Corps AWN data requirements?

Q14. How can you obtain weather information via the AWN that is not routinely received by your command?

Q15. The TT and AA indicators of a MANOP header are used to identify what information?

Q16. What information is contained in a NOTAM?

Q17. How are DIFAX products copied?

ENVIRONMENTAL WORKSTATIONS

LEARNING OBJECTIVES: Identify the primary environmental workstation used by NAVMETOCCOM. Identify the major features and software programs associated with this system.

Over the past decade the Navy has developed various METOC related PC-based systems designed to take advantage of computer technology. The original PC-based systems were integrated into Navy and Marine Corps weather offices to acquire, process, display, and disseminate meteorological and oceanographic data. Unfortunately, these original "stand-alone" PC systems took up much workspace and required more operator personnel than were available.

In the early 1990's, the first computer *workstation* developed for the shore-based Navy METOC community was introduced. This system, known as the CONTEL Meteorological Workstation (CMW), was a desktop computer system with multiple communication and display functions. It consolidated the various stand-alone systems into a single client-server system and was capable of simultaneously sending, receiving, storing, recalling, printing, and processing alphanumeric data. It also generated color graphics from processed data. By the late 1990's, the CMW was being replaced by the Meteorology and Oceanography Integrated Data Display System (MIDDS), which is discussed in the following text. A shipboard version of an environmental workstation known as the Tactical Environmental Support System (TESS) will be discussed later in the chapter.

METEOROLOGY AND OCEANOGRAPHY. (METOC) INTEGRATED DATA DISPLAY SYSTEM (MIDDS)

The Commander Naval Meteorology and Oceanography Command (CNMOC) tasked the Naval Oceanographic Office (NAVO) to develop the Meteorology and Oceanography (METOC) Integrated Data Display System (MIDDS). This system combines both government and commercial application software. The Windows-NT operating system is the base software.

MIDDS provides three primary functions. First, MIDDS is an environmental workstation where the weather forecaster or observer retrieves, processes, and

Figure 1-7.—MIDDS workstation.

displays various weather products. Second, MIDDS is a briefing station that features high-quality graphics and enhancement features. Finally, MIDDS distributes meteorology and oceanography products locally over a Bulletin Board System (BBS), the Internet, or Local Area Network (LAN). The MIDDS workstation is normally equipped with a four-monitor display unit that is used for pilot briefings and product visualization. Figure 1-7 shows the MIDDS workstation.

The MIDDS workstation requires the user to have a working knowledge of Windows NT and its functions. The hardware includes a dual-processor 486 Pentium computer with 64 megabytes of RAM, a 2-gigabyte hard drive, a CD-ROM drive, 21- and 17-inch high-resolution monitors, modems, uninterrupted power supply (UPS), keyboard, and receiver card. Complete information concerning the operation of MIDDS can be found in the *Meteorology and Oceanography (METOC) Integrated Data Display System (MIDDS)* User's *Guide.* We will discuss the various features and software programs of the MIDDS in the following text.

Router Modules

The MIDDS router (and receiver) modules are software programs that run continuously in the background and can be accessed only from the main server of the system. The router module controls all data reception and is responsible for all the system management functions. The router identifies, sorts, stores, and sends data to the appropriate directories. When the MIDDS is turned on, Windows NT automatically activates the router and receiver modules. To display the router window, you must click on the Router icon found in the "Ingest Monitor Window," as shown in figure 1-8. Your system administrator normally accomplishes all initial settings for the router during installation.

There are nine major system management functions of the router and they must be activated to run. Some of the most important router functions include an audio alarm option, an auto printing option, and automatic file conversion for ingested products. A few other important functions are discussed in the following text.

PURGING.—Purging is the most important system management function of the router module. The purger maintains the correct number of each type of product on the hard drive. The purger deletes the oldest version of a product file and replaces it with the newest version. In the original MIDDS, purging was optional. With MIDDS 2.0 and later, purging will be accomplished automatically and continually in the background.

DISK MIRRORING.—In a few cases, you may want to copy products to a different location other than where they are normally stored. This function will automatically copy specified products to another disk drive or to another computer over the network. The Disk Mirroring function allows you to maintain a suite of products in case the main MIDDS server fails.

FTP (FILE TRANSFER PROTOCOL) PROCESSING.—This function is responsible for automatically sending products and files to another

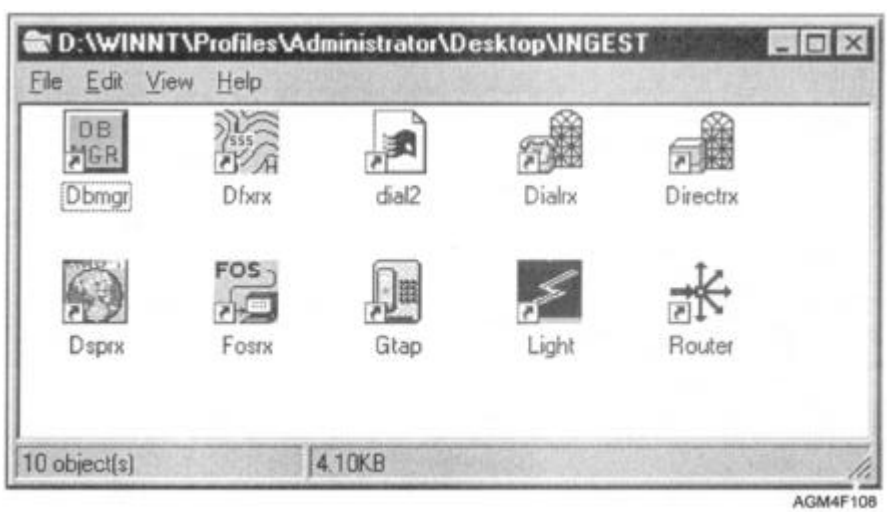


Figure 1-8.—MIDDS Ingest Monitor screen.

computer system over a network. The operator may choose to reroute selected files and products to remote sites on a predetermined schedule. The FTP function can be used to send critical tiles to a remote site. Only one file may be sent at a time.

ARCHIVING.—Aircraft accidents, storm tracks, and high interest areas provide good reasons to save environmental data. The archive function allows you to save individual products and files to floppy disk. As data is received, it is automatically copied to the destination path and drive.

FUSION GENERATOR.—This function allows you to overlay various METOC products, such as a satellite image with a radar image. The operation can be set up automatically for predefined products at specified time intervals. There are several map projection and color scheme options available. In addition, alphanumeric data ingested from the AWN can also be fused with other geo-referenced products. This allows you to overlay any type of data, such as sea level pressure contours with temperature contours, surface winds with precipitation, and so forth.

Receiver Modules

The MIDDS has several receiver modules that define which products to receive from satellite data, radar data, AWN data, and digital facsimile data.

SATELLITE (DSP) RECEIVER.—This module allows for the reception of satellite images from GOES-Tap, HF receiver, APT, or WEFAX. The images are stored in PCX format and can be captured in several sizes. Images can be viewed as they are being received, and a looper display capability is provided. A database of several different satellites is loaded during installation. (Digital GOES 8 and 9 imagery will be received over the Internet or via the Dial RX receiver.)

DIFAX RECEIVER.—This module allows you to receive digital facsimile products from the National Weather Service. Your system administrator will establish a DIFAX product database during installation.

DIAL RX RECEIVER.—This module acquires radar images from WSR-88D radar sites by using a commercial dial-up service or the Internet. It can also be used to receive GOES satellite images, alphanumeric products, and DIFAX products.

The DIAL RX accesses a master database that contains all meteorological stations, including those stations with WSR-88D radars. (The database also contains all satellite and DIFAX product types.) From this database, specific stations can be selected (activated), and desired products can then be selected from that particular station. Keep in mind that only those radars sites near your station need be activated. After you select the WSR-88D station, you then select from a list of products that you desire. Your system administrator can establish a predefined product list for each WSR-88D station. At some activities, the MIDDS computer is directly connected to a WSR-88D Principal User Processor (PUP) circuit by using a CODEX modem.

AWN RECEIVER.—This module allows observation and forecast data from the AWN to be ingested into the MIDDS. MIDDS is designed to receive AWN data, identify desired stations and products, and store the data in appropriate directories. The number of active stations can be selected from the master station database. Data requirements are usually determined through the system administrator. MIDDS ingests AWN data continuously, and a large volume of data is received. Thus, the amount of data selected for ingest must be determined very carefully.

LIGHTNING-DATA RECEIVER (LDR).—The LDR receives input from the Lightning Detection and Tracking System (LDATS). The LDATS system displays lightning data collected by the National Lightning Detection Network (NLDN), which consists of over 100 remote sensing stations that monitor cloud-to-ground lightning in the continental United States. The LDR receives LDATS data so that MIDDS can display it on a user-defined map background. This display can be an individual LDATS product or overlaid on top of radar and satellite products. MIDDS can also display the lightning data at specified time intervals.

Weather Group Applications Software

The primary function of MIDDS is to display satellite imagery, radar imagery, alphanumeric text, and weather charts. MIDDS has several data-display applications available for weather briefings, along with numerous other data manipulation and display features. The main display applications in MIDDS are SAND (Satellite, AFOS, NEXRAD, and DIFAX) and FOS (Family of Services).

SAND (SATELLITE, AFOS, NEXRAD, and DIFAX).—The SAND application is used to display three types of products: Satellite imagery, NEXRAD (WSR-88D next-generation radar data), and digital facsimile data. AFOS is the commercial way of

displaying alphanumeric data and is not used in MIDDS. SAND gives the user the ability to manipulate and display these products in several ways. The operator selects from various menu boxes and bars using the Windows format. Additional menu options allow the user to pan/zoom and rotate images, add weather symbols to displays, loop images, and automatically display range-bearing information. Customized color enhancements can also be created. The SAND application also executes automatic station plots, contour plots, Skew-T plots, and even time-series plots (fig. 1-9).

FOS (FAMILY OF SERVICES).—The Family of Services (FOS) is the applications module used to display and manipulate alphanumeric data. Forecasters need TAFs, station observations, and general text messages to successfully provide quality forecasts. The type, age, amount, and location of the data can be tailored for the needs of each forecaster.

MIDDS can display information by using three different formats: *areas* (a geographical area, such as Nevada), *routes* (two weather stations connected by a line), and groups (a random group of stations). As with the SAND application, the operator selects from various menu boxes and bars using the Windows format. Individual stations can be sorted by either station ID or name. Once the desired station is selected, the required products for that station are then selected. The data can be viewed, edited, printed, or archived.

Briefing Support

MIDDS contains a briefing support program designated as "Weather Brief." It provides the capability to create an environmental brief composed of satellite, radar, alphanumeric products, or other user-defined products from MIDDS application programs. Two different types of briefs can be created, dynamic or static. In a "dynamic" brief, products in the brief are automatically updated when new ones are ingested into

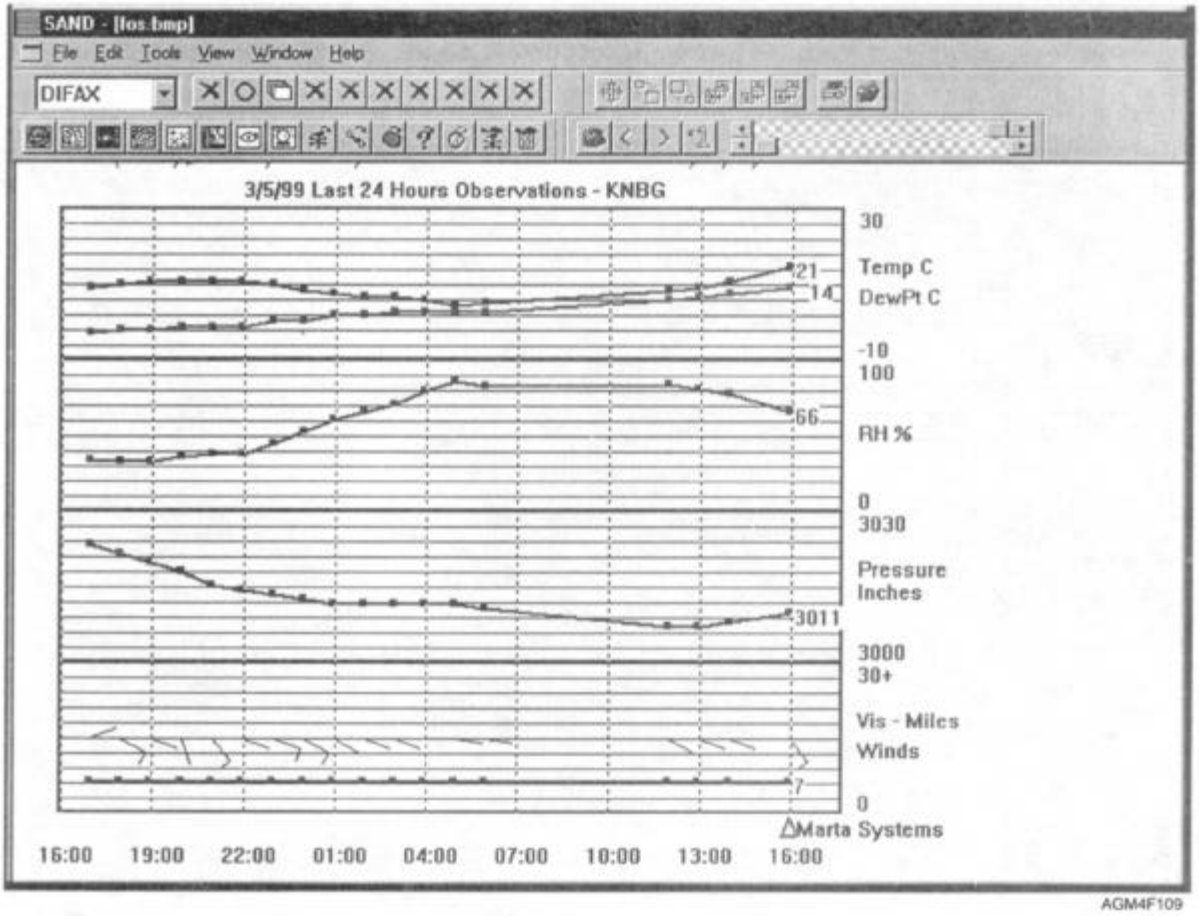


Figure 1-9.—MIDDS time-series plot.

the MIDDS. In a "static" brief, the products are saved and are not updated when new ones are ingested into the MIDDS. A static brief is essentially a snap shot of weather data at a specific point in time. This information can be quite useful during major weather events. The idea is to preserve your data for future reference. MIDDS can also display a brief over a LAN through a web browser with Hypertext Markup Language (HTML). You may create multiple briefs tailored for many users.

In addition, the MIDDS weather brief program will enable aviation weather forecasters to provide computerized flight weather briefing forms (DD Form 175-l) while remaining in accordance with NAVMETOCCOMINST 3140.14, *Procedures Governing Flight Weather Briefings and Preparing DD Form 175-1 and U.S. Navy Flight Forecast Folder.* This program contains the entire DD Form 175-1 and is subdivided into its respective parts (I through IV). The program is designed to automatically ingest TAF and observation data from the AWN and place it on the form (fig. 1-10). All DD-175-1 briefs may be archived to a floppy diskette or another hard drive.

Automated Surface Observing System (ASOS)

A communications link between MLDDS and the Automated Surface Observing System (ASOS) may be established. The software for this application is divided into two main sections, ASOS Data Server and ASOS Data Manager. The ASOS Data Server is a software program providing ingest and dissemination of 1-minute surface observation data from the ASOS. The other software program is the ASOS Data Manager. This application provides a display of both current and historical ASOS data in an easy-to-use method. The main display consists of a menu bar, two graphs, panes for the latest reported observation, wind speed and direction dials, and a "current status" banner (fig l-l 1). The two graphical displays are "strip charts," which can provide visual analysis of weather phenomena trends, such as temperature and wind speed. As an additional feature, alarms can be set to go off when station

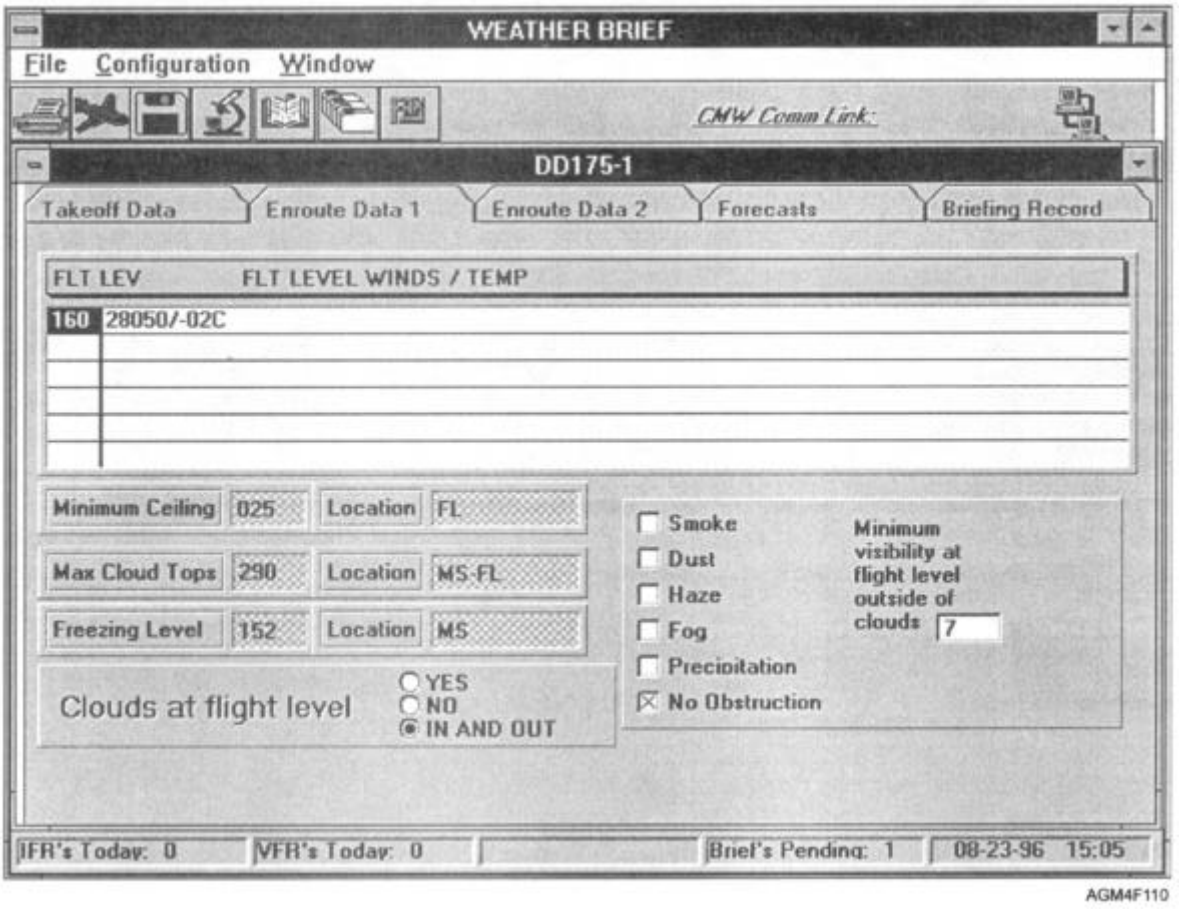


Figure 1-10.—Flight weather briefing form (DD Form 175-l) constructed using MIDDS.

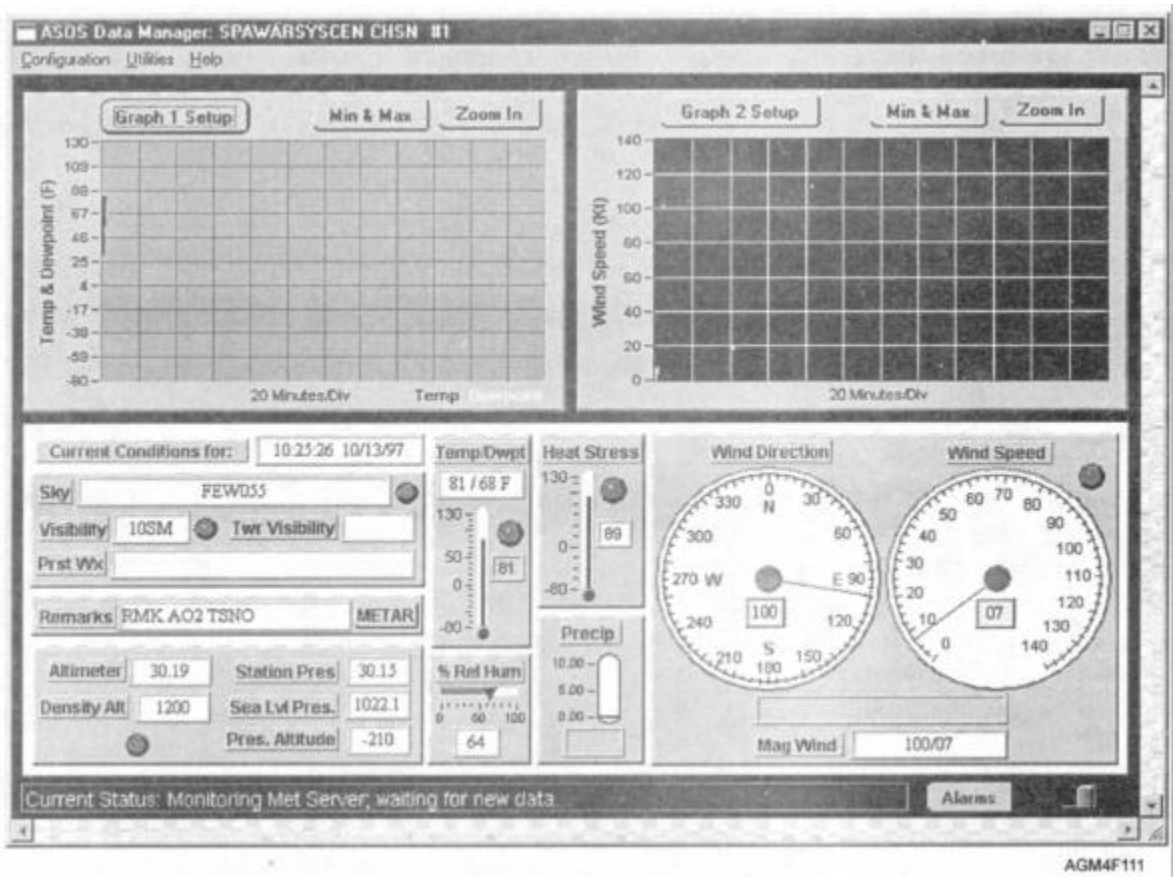


Figure 1-11.—ASOS Data Manager main display window from MIDDS.

minimums, such as ceiling and visibility are reached. When the Message Format Transmitter (MFT) software is installed, it will provide templates for surface observations and TAFs, perform quality control checks for observations, and automatically transfer observation data to the AWN and to FNMOD, Asheville, for archive.

Internet and Bulletin Board Access

MIDDS provides direct dial-in and Internet connectivity into the Navy Oceanographic Data Distribution System (NODDS), the Optimum Path Aircraft Routing System (OPARS), and the Joint METOC Viewer (JMV). All of these programs originate at FNMOC and are discussed in detail in chapter 2 of this module.

GFMPL GROUP APPLICATION SOFTWARE

The Geophysics Fleet Mission Program Library (GFMPL) is a software library that provides meteorological, electromagnetic, oceanographic, hazard avoidance, and acoustic support for fleet operations. MIDDS includes the "Unclassified" portion of GFMPL integrated into a Windows NT format. Certain electromagnetic assessment parameters are omitted from the standard GFMPL modules available in the classified version. Some of the GFMPL programs that are available include tidal prediction, tropical cyclone track, and surf prediction. An on-line user's guide is available with the MIDDS. The GFMPL program is discussed in detail in chapter 2 of this module.

REVIEW QUESTIONS

Q18. What are the primary functions of MIDDS?

Q19. What is the purpose of the MIDDS Fusion Generator module?

Q20. What products are acquired by using the MIDDS Dial RX receiver?

Q21. The MIDDS SAND application is used to display what types of information?

Q22. What is the function of the MIDDS FOS module?

Q23. A Flight Weather Briefing form (DD-175-1) can be completed by using which MIDDS application?

Q24. Which MIDDS software application tool can provide temperature trend graphs for your station?

NAVAL MESSAGE TRAFFIC

LEARNING OBJECTIVES: Identify the primary message traffic system used by the Navy. Identify the various parts of a standard Naval message. Identify the publication that outlines procedures for formatting Naval messages. Identify the message formatting software used by the Navy. Interpret and format a Naval message readdressal. Explain the term *minimize.*

The Navy sends thousands of messages each day. As an Aerographer's Mate, you will be required to draft naval messages. You must be able to recognize the various parts of a standard Naval message as well as possess a working knowledge of the message drafting software used by the Navy.

The primary message traffic system currently used by the Navy is the Automatic Digital Network (AUTODIN). As communications technology continues to develop, this system will be phased out as the Navy moves to desktop message creation and transmission. Within the next few years, all message traffic will be transmitted via an e-mail type system known as the Defense Message System @MS). The goal of DMS is to retain the easy-to-use and less expensive individual messaging capabilities employed in DOD e-mail systems. This will shift message handling functions away from manpower intensive communications centers to the user's desktop. The changeover to DMS will continue through the late 1990's and into the next century.

AUTOMATIC DIGITAL NETWORK (AUTODIN)

The Automatic Digital Network (AUTODIN) is a joint-use, worldwide, computerized, communications system. It is managed by the Defense Communications Agency (DCA). AUTODIN provides for the transmission of both narrative and graphic data traffic on a store-and-forward basis. AUTODIN provides reliable, secure, and efficient communications using high-speed transmission equipment that incorporates error detection. Interface equipment translates all input into common machine language, thereby making AUTODIN compatible with many computer codes, speeds, and other media, such as cards and tapes.

The Naval Communications Processing and Routing System (NAVCOMPARS) is an automated communications system that serves as the interface between AUTODIN, other networks ashore, and operational units of the Navy. AUTODIN traffic is entered into NAVCOMPARS for distribution. NAVCOMPARS forwards messages to fleet units and provides broadcast management and HF or satellite broadcast keying. It also provides on-line communications with the Common User Digital Information Exchange System (CUDIXS) and the Fleet Multichannel Broadcast (FMCB).

The *Gateguard* subsystem is an AUTODIN Gateway Terminal (AGT) that provides the user a "gateway" into the AUTODIN system. It essentially provides secure electronic message service from the telecommunications center to the user's desktop computer. Gateguard also acts as a security guard device, hence the name Gateguard. Users may also use Gateguard to route incoming messages to various offices via their local area networks (LANs).

As was previously mentioned, AUTODIN will eventually be phased out in favor of DMS. Many of the changes will be transparent to the user. The mechanics of either system do not concern the average weather observer. The main point is that you understand the Navy message format.

NAVAL MESSAGE FORMAT

For message traffic to be properly routed to intended recipients, message traffic must be properly formatted. Naval messages are usually composed on desktop computers using specialized message composition programs that assist the user in selecting proper format entries. The software endorsed Navy-wide is known as *Message Text Format (MTF) Editor.* The software assists the user in composing United States Message Text Formatted (USMTF) messages as well as non-formatted messages. The software is menu-driven and allows the user to draft a formatted message by using a "fill in the blank" template. Within each MTF

message are specific blocks of information known as *sets*. Each set begins with the set identifier, followed by a field marker (/). Double slants (//) are used as end-of-set markers. Each set contains only certain information as specified by NTP 3. Some sets are mandatory while others are not. We will discuss the use of each MTF set shortly.

Nearly all messages are formatted by USMTF procedures. The most common type of USMTF message is a General Administrative message, which follows a GENADMIN format. Other USMTF message types include special purpose messages such as CASREP (casualty reports), LOGREQ (logistic requirements), and SORTS (maritime ship reports). Other formatted messages are currently in use by Navy and Marine Corps units, and do not follow the USMTF guidelines, such as the remaining RAINFORM formatted messages, and Movement Reports (MOVREPS). The different types of reports routinely transmitted by Navy units are discussed in NWP 1-03.1, *Operational Reports.* Instructions for completing USMTF formatted messages and free form messages are outlined in the *Telecommunications Users Manual, NTP 3.*

USMTF messages, free form messages, and other formatted messages all contain a message header and a message body that contains the text or information. Figure 1-12 is an example of an USMTF GENADMIN message.

Message Header

AUTODIN message headers contain several elements that must be included in each header, as well as some elements that are only required on a case-by-case basis. The specific format of a message transmission heading and the routing indicator lines is discussed in JANAP 128, *Automatic Digital Network (AUTODIN) Operating Instructions.*

FORMAT SECTION	EXAMPLE	ITEM
HEADER	PTTCZYUW RULYNMU5678 2391235-CCCC-RULYSUU. ZNY CCCCC P 271020Z AUG 98 FM NAVLANTMETOCCEN NORFOLK VA//N30// TO USS SHIP//JJJ// INFO CINCLANTFLT NORFOLK VA//N5// BT	Transmission ID Classification Precedence & DTG Originator Addressee Info Addee Text separator
BODY OF A USMTF GENADMIN MESSAGE	C O N F I D E N T I A L //N03145// OPER/codename// MSGID/GENADMIN/NAVLANTMETOCCEN/1215/JUL// SUBJ/AVWX (U)// REF/A/DOC/NAVMETOCCOM/SEP 96// REF/B/GENADMIN/USS SHIP/270103Z AUG 98// NARR/REF A PROVIDES PRODUCT DESCRIPTION AND REF B REQUESTS PRODUCT BE PROVIDED.// POC/rank and name/command/telephone number// AKNLDG/acknowledge instructions// RMK/1.(U) METEOROLOGICAL SITUATION AT 271200Z: STRONG HIGH PRESSURE CENTERED OVER TRANSIT AREA. 2. (C) 24HR FORECAST FOR PERIOD 271200Z TO 281200Z ALONG TRACK FM 35 00N 075 00W TO 31 00N 070 00W . A. SKY, WEATHER: CLEAR. B. VSBY (NM): UNRSTD. (and so forth. . .) DECL/30JAN99//	 Operation Message ID Subject Reference Reference Narrative Point of contact Acknowledgements Remarks-the actual text of the message. Declassification

(CLASSIFIED FOR ILLUSTRATIVE PURPOSES ONLY)

Figure 1-12.—Example of a USMTF GENADMIN message.

TRANSMISSION ID AND CLASSIFICATION.—This data identifies the sending and receiving station routing indicators, and the message sequence number. This data is usually added by the telecommunications center entering the message into NAVCOMPARS, or by the ships communications office. The third group of the top line indicates the Julian date and time of transmission. The fourth group indicates the classification level. The second line of the header is also a classification indicator.

PRECEDENCE AND DTG.—A single letter identifies the message precedence, which is the message delivery time objective. *Z* (flash) means as fast as possible with an objective of less than 10 minutes, *O* (immediate) 30 minutes, *P* (priority) 3 hours, and *R* (routine) 6 hours. The date-time group is normally the UTC date (two digits), time (four digits), three-letter month abbreviation, and two-digit year that the message was released by the originating command. The times 0000Z and 2400Z are not used. Instead, use 0001Z or 2359Z. Keep in mind that certain METOC-related messages must be assigned specific precedence codes. This information can be found in the *United States Navy Meteorological and Oceanographic Support System Manual,* NAVMETOCCOMINST 3140.1.

ORIGINATOR.—After the *FM* designator, the command that originated the message is indicated by a Plain Language Address (PLA) listing, followed by the originating office code set-off within double slants.

ADDRESSEE.—The *TO* portion of the header identifies by PLA, specific commands that must act on the information contained within the message. Instead of, or in addition to, specific commands, the message may be addressed to one or more Collective Address Designators (CADS), or Address Indicating Groups (AIGs). CADS are made up of predetermined lists of commands or communities of like interest. CADS may be as encompassing as *ALCOM,* a CAD for all commands (general messages), or limited to just several commands, such as *OCEANO EAST,* used to send weather observation from ships in the Atlantic Fleet to the Naval Atlantic Meteorology and Oceanography Center in Norfolk and to FNMOC in Monterey. CAD listings for various types of METOC-related messages are listed in NAVMETOCCOMINST 3140.1.

An AIG is defined as an address designator representing a list of specific and frequently recurring combination of ACTION and/or INFORMATION addresses. For example, AIG 76 is used by FNMOC to send message traffic to certain activities concerning administrative and operational information, as well as notification of outages.

Most of the PLAs and CADs used within the Department of Defense are listed by the Distributed Plain Language Address Verification System (DPVS). The purpose of DPVS is to provide naval message originators *immediate electronic* access to current single and collective PLA information. It is designed primarily to be used with the MTF Editor message preparation program. Updates are sent via BBS, Internet, and record message.

INFO ADDEE.—The *INFO* portion of the header identifies PLAs of commands who need the information provided in the message for information purposes only; no action is required on their part.

EXEMPT LISTING.—If a command normally included in a CAD should not receive a specific message, an exempt listing must be included in the message header immediately following the last action or info addressee. The exempt listing is identified by the abbreviation *XMT*. The PLA for the exempt command follows the *XMT.*

TEXT SEPARATOR.—The text separator is the letters *BT.* This indicates the separation or break between the heading and the body of a message.

CLASSIFICATION AND SSIC.—Although actually apart of the message body, we will consider the classification and SSIC line to be part of the message header since this line must be included in all AUTODIN messages. The classification and SSIC line uses an identical style in all of the various message formats. The message classification is entered on a message by the classification word plus any special handling instructions. The classification is entered either as *UNCLAS, CONFIDENTIAL, SECRET,* or as *TOP SECRET,* with each letter separated by a space. After the last special handling instructions, the Standard Subject Identification Code (SSIC) is entered, bracketed by double slants. For example, //N03145// is the SSIC for Enroute Weather Forecast (WEAX) messages. SSIC codes *are* found in *Department of the Navy File Maintenance Procedures and Standard Subject Identification Codes (SSIC,), SECNAVINST 5210.11.*

USMTF GENADMIN Message Body

The GENADMIN format is used for all administrative traffic and most outgoing weather forecast products. Terminal aerodrome forecast (TAF) messages also follow this format when transmitted via

AUTODIN. However, ship observations use a free format. Refer again to figure 1-12. The message body follows a USMTF GENADMIN message format used for an outgoing Aviation Enroute Weather Forecast (AVWX). We use this as an example only. Consult NAVMETOCCOMINST 3140.1 for complete content and examples of USMTF GENADMIN forecast formats. Passing instructions, such as "PASS TO EMBARKED MOBILE TEAM," may be included following the SSIC. Passing instructions are used only for exceptional cases not covered by the use of office codes.

OPERATION OR EXERCISE.—Immediately following the classification line, an optional line is used to indicate that the message concerns a naval or joint exercise, or an actual military operation. The indicator *OPER/*, used for operations, is followed by the operation code word, the operation plan number, the primary operation sub-plan nickname, and the secondary sub-plan nickname (if used), all set off by slants.

MESSAGE ID.—The USMTF message type abbreviation line, beginning with the set identifier *MSGID/*, is used to identify the message type, such as GENADMIN. It is followed by the message originator's short title, and optionally by the originators serial number, and the month, all set off by slants. The Message ID set is mandatory.

SUBJECT.—The subject line is a mandatory entry beginning with the set identifier *SUBJ/*, and followed by the subject of the text of the message.

REFERENCE.—References, entered following the *REF/* set identifier, are optional. References may be any identifiable message, document, correspondence, conference, meeting, or telephone conversation that is pertinent to the message. Each reference cited must be followed by an *AMPN/*, or amplification data line providing the title of the reference. Figure 1-13

CONFERENCE
REF/A/CON/CDR 82ND AB DIV/20SEP98//
AMPN/AIRBORNE COMMANDERS CONFERENCE, FT BENNING GA//
MEETING
REF/A/CON/COMNAVWEPS CTR/02NOV98//
AMPN/JOINT ORDNANCE WORKING GROUP MEETING, DAHLGREN VA//
DISCUSSION/CONVERSATION (other than by telephone)
REF/A/CON/CINCFOR/l1MAR98//
AMPN/BETWEEN MAJ SMITH CINCFOR(FCJ3J) AND CDR JONES USACOM(J36)//
TELEPHONE
REF/A/TEL/COMSPAWARSYSCOM/08DEC98//
AMPN/TELCON BETWEEN SPAWAR/LCDR SMITH AND NPMOC/LT JONES//
DOCUMENT (publication, instruction, regulation, etc.)
REF/A/DOC/JCS J7/15AUG98//
AMPN/JCS PUB 1-01, CHAP II, PARA 3.//

REF/A/DOC/DOD/14MAR98//
AMPN/DIR 5000.1, SUBJECT: MAJOR AND NON-MAJOR DEFENSE
ACQUISITION PROGRAMS, PG 3, PARA D3.//
LETTER (correspondence, memorandum, E-mail, etc.)
REF/A/LTR/COMNAVMETOCCOM N411/09DEC98/
AMPN/TASKING LTR TO NLMOC, SUBJ: TESS EVAL SER N411/123//

REF/A/LTR/NLMOD PATUXENT RIVER/11NOV98//
AMPN/E-MAIL FROM NLMOC/CAPTSMITH/LT JOHNSON, SUBJ:RAINFALL MEASUREMENTS//
VOICE MESSAGE
REF/A/VMG/NAVY PC188/151232ZNOV98//
AMPN/PIREP RCVD BY NLMOF JACKSONVILLE ON 271.6MHZ//
RECORD MESSAGES (Other than MTF formatted messages)
REF/A/MSG/JCS J7-JETD/240700ZMAR98/ /
AMPN/ALERT ORDER: OPERATION DEAL CARDS (U)//

Figure 1-13.—Examples of GENADMIN references.

```
C O N F I D E N T I A L //N03141//
SUBJ: SYNOP WEA OB (U)
BBXX SHIP 01124 99251 70803 41998 03210 10245 20232 30132 40136 54000
          70154 80000 22211 00230 20401 30000 40000 50000 80226;
DECL 31MAR99
```

(CLASSIFIED FOR ILLUSTRATIVE PURPOSES ONLY)

Figure 1-14.—Example of a free form message body.

includes examples of several types of references used in messages. When two or more references are provided, a narrative line, indicated by the identifier *NARR/*, must be included. The narrative line explains the importance of the references. The acronym NOTAL (not to or needed by all) is used to indicate that some addressees do not hold the referenced material. The acronym PASEP (passed separately) is used to indicate that the reference has been passed separately to some or all addresses of the message.

POINT OF CONTACT.—The set identifier *POC/* indicates the message or information point of contact (POC) at the originating command. The rank and name of the POC is followed by the command name or code, and by the telephone number, all set off by slants. This field is mandatory on all GENADMIN messages.

ACKNOWLEDGEMENT INSTRUCTIONS.—If receipt of the message is required in writing or by message, special message acknowledgement instructions may be entered following the set identifier *AKNLDG/.*

REMARKS.—Now look back at figure l-12. Following the *RMK/* set identifier is the actual text of the message. Numbered paragraphs may be used, but are not required. Be sure to mark paragraphs of classified messages with the appropriate classification symbol.

DECLASSIFICATION.—Declassification instructions must be included on every classified message. This entry is not used on unclassified, EFTO, or FOUO messages. Insert the date or event (which must be less than 10 years from the origination date of the message). Certain categories of information are exempt from the 1 O-year rule and are indicated with the codes X1 through X8.

While many forecast products transmitted via AUTODIN follow the USMTF GENADMIN format, certain coded products, such as synoptic ship surface weather observations and ship upper-air observations follow a free format.

Free Format Message Body

The free format message uses the same style header and classification line, but the remaining message body is much simpler (fig. 1-14). Notice that none of the information included in the body is set off in slants. Free form messages may also use a numbered paragraph and lettered subparagraph convention if necessary for clarity. When numbered paragraphs are used in classified free-form messages, a classification marking for each paragraph follows the paragraph number, as shown previously in figure l-12.

Message Readdressals

A message originator and/or recipient may find it necessary to transmit a message to an activity that has a

```
RTTUZYUW RULSWCA0032 0020059-UUUU-RHMCSUU
ZNR UUUUU
R 020059Z JAN 98 ZYB
FM NAVPACMETOCCEN PEARL HARBOR HI//N31//
TO NAVPACMETOC DET BARBERS PT HI//N01//
BT
RADDR 123456          (Processing sequence number (PSN) of original message)
USS NIMITZ//010030Z JAN 98 (PLA and date/time group of original message)
BT
```

Figure 1-15.—Example of a message readdressal.

need to know, but which was not an addressee of the original message. This process is called message readdressal. The originator or action addressee of a message may readdress that message to another activity for action or info. Information addressees may readdress a message to another activity for information only. Separate readdressal requests must be made for each message and/or section being readdressed. Figure 1-15 is an example of a message readdressal. The MTF editor program will provide all required fields.

Reduction in Transmission of Message Traffic (MINIMIZE)

When an actual or simulated emergency arises or is anticipated, it may become necessary to reduce the volume of record and/or voice communications by imposing *MINIMIZE* on all military circuits. This action is designed to reduce message traffic during high tempo operations. Only traffic directly related to mission accomplishment or safety of life is considered essential and therefore appropriate for electronic transmission. Even high precedence messages that do not meet this criteria cannot be transmitted during MINIMIZE. In most cases, MINIMIZE is imposed only for a particular geographical region or operating area. Certain METOC-related messages, such as high wind and high seas warnings, are exempt from MINIMIZE as per NAVMETOCCOMINST 3140.1. Weather and oceanographic observations are considered significant and should be transmitted during MINIMIZE when any conditions listed in table 1-3 exist.

Table 1-3.—Weather and Oceanographic Conditions Exempting Observation From MINIMIZE

WEATHER OR OCEANOGRAPHIC CONDITION
Wind speeds in excess of 34 knots.
Sea height of 12 feet or greater.
Moderate or heavy precipitation.
Pressure change of 3 hPa or greater within the past 3 hours.
Visibility less than 1 mile.
Oceanographic observations as dictated by current operations.
Volcanic activity producing volcanic ash.

REVIEW QUESTIONS

Q25. Which subsystem of AUTODIN acts as a security screen for incoming messages?

Q26. Which computer software is used by the Navy to format electronic messages?

Q27. What publication outlines procedures for formatting USMTF messages?

Q28. Where can a listing of METOC-related Collective Address Designators (CADs) be found?

Q29. What is the fastest way to obtain correct Plain Language Address (PLA) information?

Q30. When is the set identifier "NARR/" used in a GENADMIN message?

Q31. Declassification dates are valid for what maximum period?

Q32. What are the two essential considerations for sending electronic message traffic during MINIMIZE conditions?

PMSV RADIO COMMUNICATIONS

LEARNING OBJECTIVES: Recognize the purpose of PSMV. Discuss proper PMSV radio operation procedures and proper voice radio communications protocol.

Pilot-to-Meteorological Service (PMSV) radio transceivers are found at most military aviation weather offices ashore. PMSV is used to relay meteorological information between airfield weather offices and aircraft pilots. Operating frequencies for each site are assigned by the Federal Communications Commission (FCC). PMSV transceivers operate in the VHF and UHF frequency ranges, with assigned frequencies generally around 200 to 400 MHz. The frequencies for PMSV services are listed in the DOD Flight Information Publications (Enroute), IFR Supplements, commonly called *DOD FLIP IFR Supplements.* If an airfield has a PMSV radio, the frequency is listed for the airfield as the *METRO* frequency, under the *Communications* heading.

The radio transceivers are set to operate only on the assigned frequency. Normally only the amplifier unit with an audio speaker and an attached push-to-talk microphone is located within the weather office. The actual transmitter, receiver, and antenna assemblies are

usually located in the base operations radio transmitter room. Base electronics personnel perform maintenance on the equipment.

The amplifier within the weather office is left in the "on" position whenever the station is open. Pilots do not routinely monitor the transmission frequency, but rather turn to the frequency only when they wish to talk to a forecaster or an observer. The only way the weather forecaster can initiate contact with an aircraft is to have the Air Traffic Controller direct the aircraft to tune to the METRO frequency and contact the office. This, however, is rarely done.

When talking to aircraft on the PMSV radio, proper military radio protocol must be used at all times. You must use *prowords* when applicable. Prowords are pronounceable words or phrases that have been assigned specific meanings in order to expedite voice message traffic. No personal conversation or general chitchat is permitted. Proper radio procedures are discussed in detail in Allied Communication Publication (ACP) 125, *Communiculion Instructions Radiotelephone Procedures.* The following guidelines summarize some of the important information provided in ACP 125. **YOU SHOULD AVOID THE FOLLOWING:**

- Misuse of call signs
- Unofficial conversations
- Excessive repetition of prowords
- Use of plain language in place of applicable prowords
- Unnecessary transmissions
- Identification of unit locations
- Use of profane, indecent, or obscene language
- Transmitting when loud background conversations or noise-levels are present
- Depressing the transmit button before you are ready to talk, or holding the transmitter button after you have finished talking

YOU SHOULD ALWAYS DO THE FOLLOWING:

- Speak clearly, slowly, and distinctly, in a normal, yet strong voice
- Avoid extremes in vocal pitch
- Send traffic in phrases rather than word by word
- Hold the mike 2 to 4 inches from your mouth
- Say individual digits, not the combined number

Table 1-4 contains prowords frequently used in PMSV conversations and their meanings. Use these prowords as necessary.

Your station's call sign is your airfield's name followed by the word *METRO.* NAS Pensacola, for example, is *Sherman Field,* so the PMSV station's radio call sign is *Sherman METRO.*

When contacting a PMSV station, an aircraft will first provide the aircraft's call sign, and then the PMSV station's call sign. For example, "NAVY ALFA GOLF ONE ONE ZERO, SHERMAN METRO." Your reply should be, "THIS IS SHERMAN METRO, GO AHEAD NAVY ALFA GOLF ONE ONE ZERO, OVER." From this point on until the end of the conversation, it is not necessary to repeat your call sign or the aircraft's call sign unless several aircraft are calling or standing by on the frequency at the same time.

Take the aircraft's request for information or the information passed. Use the word *OVER* at the end of each transmission to the aircraft, and then release the mike key. Do not depress the mike key again until the aircraft has finished talking and given you control of the mike by the keyword *OVER.* Use the phonetic pronunciation for each digit in a number, such as "WIND THREE-THREE-ZERO DEGREES," instead of, "WIND THREE-HUNDRED THIRTY DEGREES."

When an aircraft asks for information that is not immediately available, reply "ROGER, WAIT, OUT." Obtain the information, recontact the aircraft by stating your call sign, and then the aircraft's call sign, such as "SHERMAN METRO, NAVY ALFA GOLF ONE ONE ZERO." Pass the information only after the aircraft has responded.

Do not pass weather observation or forecast data by reading the code form. Rather, convert the observation report or forecast to understandable English. You may be brief by prefixing the values with an identifying word, such as *sky, ceiling, wind,* or *altimeter. In* some cases, you may use common abbreviated words to identify information, such as *temp,* instead of temperature; *dew point,* instead of dew-point temperature; *PA,* instead of pressure altitude; or *DA,* instead of density altitude.

If you find it is necessary to spell out long sections of a narrative, use the following words for the punctuation markings: *comma* (,), *period* (.), *paren* (( ),

Table 1-4.—Frequently Used PMSV Radiotelephone Prowords and Meanings

ACKNOWLEDGE	An instruction to the receiver that the transmission must be acknowledged.
ALL AFTER	Reference all of a transmission after the word or phrase given.
CORRECT	What you have transmitted is correct.
CORRECTION	I have made an error and the correct information follows.
FIGURES	Numerals or numbers follow.
I SPELL	The next word will be spelled out phonetically.
OUT	This is the end of the transmission, no reply is expected.
OVER	This is the end of my transmission at this time, your reply is necessary.
ROGER	I have received your transmission satisfactorily.
SAY AGAIN	Repeat the last transmission.
THIS IS	This transmission is from the station whose call sign immediately follows.
TIME	That which immediately follows is the date-time group of the message.
WAIT	I must pause for a few seconds.
WAIT, OUT	I must pause longer than a few seconds and will recontact you by call sign.
WILCO	I have received your signal, understand it, and will comply. Since the meaning of ROGER is included in that of WILCO, the two prowords are never used together.
WRONG	Your last transmission is incorrect; the correct version follows.

unparen ( )), *slant* (/), *quote* or *unquote* ("), *hyphen* (- in a hyphenated word), *colon* (:), *semicolon* (;), and *dash* (-) when used between numbers or letters and numbers. Numbers are always pronounced as follows: ZE-ro, Wun, Too, Tree, FOW-er, Fife, Six, SEV-en, Ait, and NIN-er. Letters are always pronounced, when spelling out a word, by using the ICAO international phonetic alphabet (AL-fah, BRAH-VOH, CHAR-lee, etc.). You studied the international phonetic alphabet in *the Basic Military Requirements* training manual, and a copy is provided on the first or second page of each DOD FLIP IFR Supplement.

Pilots transiting from coastal air stations to U.S. naval ships operating off the coast commonly call via PMSV for updates on the latest observation and forecast for "USS SHIP." Since relating the name of a U.S. naval ship to its location, or even the fact that a certain ship is operating in the area is usually classified, the pilot may not ask for the weather for the ship by name. It is essential that military observers or, at least, the duty forecaster keep informed of the naval ships operating within their area of responsibility (AOR). Additionally, although the weather observations from the ships contain the ship's location and identification, and are therefore classified, the PMSV operator must have access to the ship's latest observations and TAFs.

The ship's TAF, by itself, is usually not classified since it does not provide the ship's position. Weather observers, even in nonsecure work areas, may obtain and keep a sanitized copy of the ship's observation and forecast handy for ready reference. A *sanitized* copy means that the ship's name, all references to locations, and message routing indicators have been deleted.

When passing U.S. Navy ship weather updates to aircraft via PMSV, do not mention the ship's position or the name of the ship. Also, do not discuss expected arrival time of the aircraft at the ship, since this would give hostile forces a good estimate of the ship's distance from shore. Rest assured, the pilot can find the ship and knows within minutes when his aircraft will be arriving. You may have to read an entire TAF forecast over the radio to prevent giving away the flight duration.

In addition to the communication systems we have just discussed, several communications systems or subsystems are designed especially for shipboard or mobile operations. Some of the systems are intended primarily for environmental communications, while

others are used for several different applications. In the next section, we will first cover shipboard computer networks and workstations, followed by a discussion of SHF satellite broadcasts and HF facsimile broadcasts. We will complete the chapter with a discussion of shipboard HF radio systems.

REVIEW QUESTIONS

Q33. What is the purpose of the PMSV?

Q34. What does the proword "WILCO" indicate?

Q35. What would be the proper pronunciation of a wind direction of 250° *at 17 knots?*

Q36. When relaying a current U.S. Navy ship observation to a pilot over PMSV, what information must not be released?

SHIPBOARD ENVIRONMENTAL WORKSTATIONS AND COMMUNICATIONS SYSTEMS

LEARNING OBJECTIVES: Identify the components of the Tactical Environmental Support System (TESS). Identify the systems associated with the Navy Integrated Tactical Environmental Subsystem (NITES). Identify the components of the Interim Mobile Oceanographic Support System (IMOSS). Identify the basic functions of TESS and IMOSS.

There have been dramatic changes to shipboard communications over the last several years. The advent of the Internet and other advancements in communications technology have improved connectivity between ships and shore-based facilities. These changes have greatly enhanced the quality of environmental support provided by shipboard Aerographer's Mates. To make the most of these changes, several new environmental computer workstations and communication networks have been, and will continue to be, introduced.

TACTICAL ENVIRONMENTAL SUPPORT SYSTEM (TESS)

Aboard ship, a large portion of your workday will be spent working at one of the Tactical Environmental Support System (TESS) workstations. TESS is a modular, interactive, computer-based system that collects, processes, analyzes, displays, and disseminates METOC data and products. It has been installed afloat on most major combatant ships, such as aircraft carriers and command ships, as well as ashore at NAVMETOCCOM regional centers and facilities, and at Tactical Support Centers (TSC).

The original version of TESS was developed in the mid 1980s as the first stand-alone environmental workstation and has been the backbone of METOC-related information for the shipboard Aerographer's Mate. TESS has gradually evolved into a complete environmental and communications workstation. In 1990, the TESS (3) system was introduced. It provided a larger selection of meteorological and oceanographic products and was the first system that provided connectivity between ships and shore-based METOC activities. The Shipboard Meteorological and Oceanographic Observing System (SMOOS) was also introduced in conjunction with TESS (3). Since then, technology advancements such as the Internet have made enormous amounts of environmental information readily available. As a result, *TESS-Next Century (TESS-NC)* was introduced in 1997 to take advantage of this technological surge. However, until TESS-NC is fully fielded, an interim system, known as TESS-NC Transition, has been made available to the fleet.

The environmental software programs in TESS are ultimately designed to provide tailored meteorological and oceanographic products, as well as electromagnetic propagation, acoustic, and satellite products. This information is used to provide direct tactical support to naval air, surface, and USW operations. TESS assesses the effects of the environment on fleet platforms, weapons, and sensors. TESS products are designed to be timely, valid, and practical. The analyses and predictions from TESS are based on information obtained from various telecommunications channels as well as on-scene observations. In addition, TESS makes use of radio teletype information, HF and satellite information, scientific models, and historical data. In chapter 2, we will describe some of the TESS software programs and their applications.

TESS-NC Transition

The TESS-NC Transition system consists of several personal computers and accessories. The TESS-NC Transition takes advantage of a variety of Commercial off-the-shelf (COTS) products, hardware, and software. Installation of this system provides added functionality not previously supported by TESS (3), including direct ship-to-ship and ship-to-shore

communications, and data access via INTERNET/ NIPRNET/SIPRNET.

TESS-NC TRANSITION HARDWARE.—The physical appearance of TESS varies with the version of the system in use as well as the location of each system. Most TESS-NC Transition systems retain the deck-mounted, shock-isolated equipment cabinets of the TESS (3) as shown in figure 1-16. The individual cabinets need not be located together, but are usually distributed throughout the shipboard METOC office spaces to provide several different workstations. The primary operating system for TESS-NC Transition is Windows NT 4.0. Each TESS-NC Transition system consists of an METOC NT server, a METOC Terminal server, and a METOC workstation. These components are setup as a separate Windows NT domain. The AN/SMQ-11 satellite receiver and a supplemental remote workstation are also interfaced with the system, but are not part of the Windows NT domain.

The METOC NT Server is the primary operator workstation for the TESS NC Transition. It stores all user information and profiles and authenticates all user logons to the network. The METOC NT server consists of a dual Pentium Pro 200 MHz processor with 128 megabyte RAM, a 4.2 gigabyte hard drive, and CD-ROM. The METOC Terminal Server acts as a back-up to the NT server. It operates with a single Pentium Pro 200 MHz processor, with 64 megabyte RAM, a 2.1 Gigabyte hard drive and CD-ROM. This computer is designed without keyboard capability, providing domain services without operator interaction. The METOC Terminal server handles data ingest for SMOOS as well as other external communication lines. It also supports the closed circuit television (CCTV) briefing capability. The METOC workstation acts as a secondary operator workstation and consists of a Cyrix 200 MHz processor. It contains a high-resolution color monitor and a keyboard. One or more color printers are also connected to the TESS-NC Transition system.

TESS-TRANSITION SOFTWARE.—As mentioned, the METOC NT server, the METOC Terminal server, and the METOC Workstation operate by using the Windows NT 4.0 operating system. Each computer is loaded with Microsoft Office and commercial web browsers for the Internet. Numerous other government and commercial software programs are available and will be discussed in chapter 2. The *most important difference from previous versions of TESS is Internet access.* Additional information is provided in the *Supplemental Operator's Manual for the Tactical Environmental Support System Next Century (NC) Transition,* SPAWAR document EE685-HC-SUP-010.

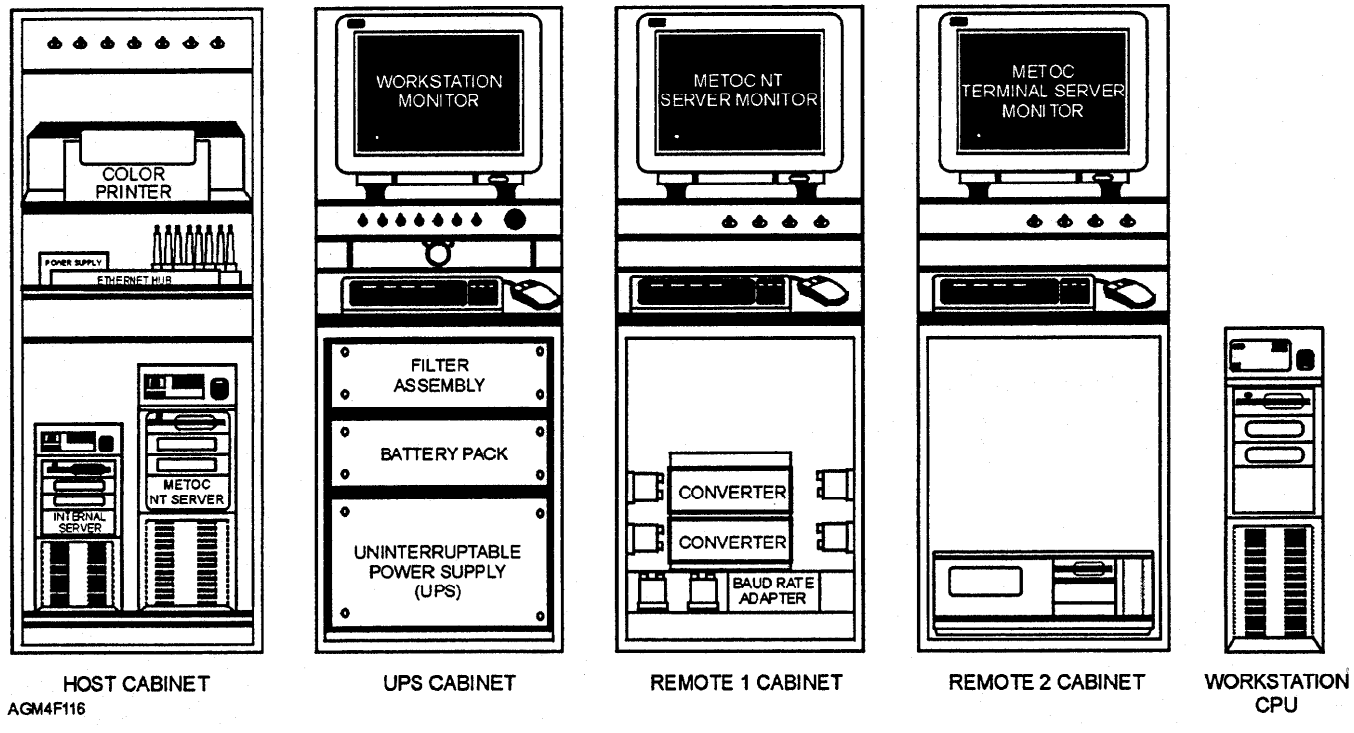


Figure 1-16.—TESS-NC Transition hardware configuration for aircraft carrier METOC office.

TESS-Next Century

The Tactical Environmental Support System-Next Century or TESS-NC is the latest in a series of scheduled changes to shipboard (as well as shore-based communications) for the next century. The vision for this system is to provide easy access not only to a wide range of data from various sources, but also to interface with remote systems to access a variety of environmental applications programs. TESS-NC will provide a METOC database containing climatological data, on-scene environmental measurements, and numerical forecasts. TESS-NC will have the capability to produce analyses and forecasts, to support weather briefings, and also provide tactical decision aids. The goal is to provide maximum flexibility to support the individual needs of each site.

As of this writing, the final configuration of TESS-NC is not available. TESS-NC will retain the basic configuration of the TESS-NC Transition, but will be equipped with more powerful computer processors. It will consist of at least three PC workstations using 300 to 500 MHz Pentium processors. Each of these workstations will have SIPRNET access. An unclassified workstation, operating with a 300 to 500 MHz Pentium processor, will be used for NIPRNET access, HF facsimile download, and connection to the ship's LAN. A standard 166 MHz laptop with SIPRNET access is also included. Additionally, TESS-NC will have a Unix-based server and workstation for access to the Global Command and Control System-Maritime (GCCS-M). The system will also have connectivity to the SMQ-11 (fig. 1-17). Software for TESS-NC is discussed in chapter 2.

TESS-NC is actually included with several METOC-related support systems under the umbrella of the Navy Integrated Tactical Environmental Subsystem (NITES). NITES incorporates five major subsystems identified as NITES I through V (fig. 1-18). NITES I will be the classified local data ingest center and principal METOC analysis and forecast system. NITES I is in fact another designation for the TESS-NC. NITES II is the METOC-related software segment found on the Global Command and Control System-Maritime (GCCS-M). NITES II is actually a classified network that will provide access to a distributed METOC database via a GCCS-M Unix workstation. NITES III is the *unclassified* forecast, briefing, and display system tailored to Naval METOC shore activities in support of aviation operations. This system will be the eventual replacement for the MIDDS, which was discussed earlier in the chapter. NITES IV is the

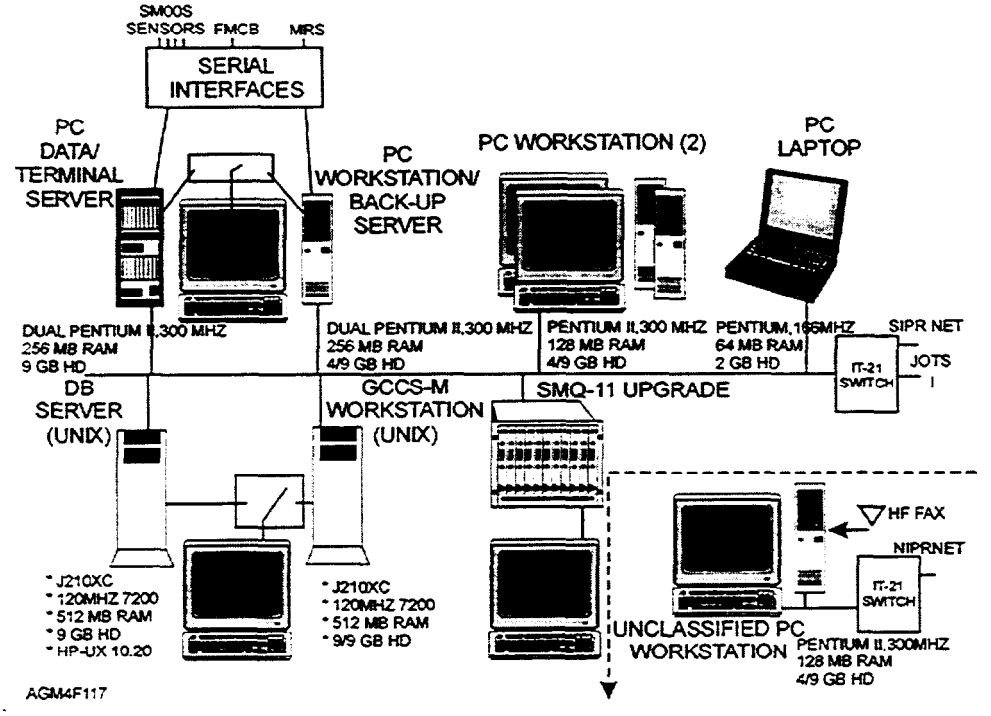


Figure 1-17.—TESS-NC hardware configuration for afloat units.

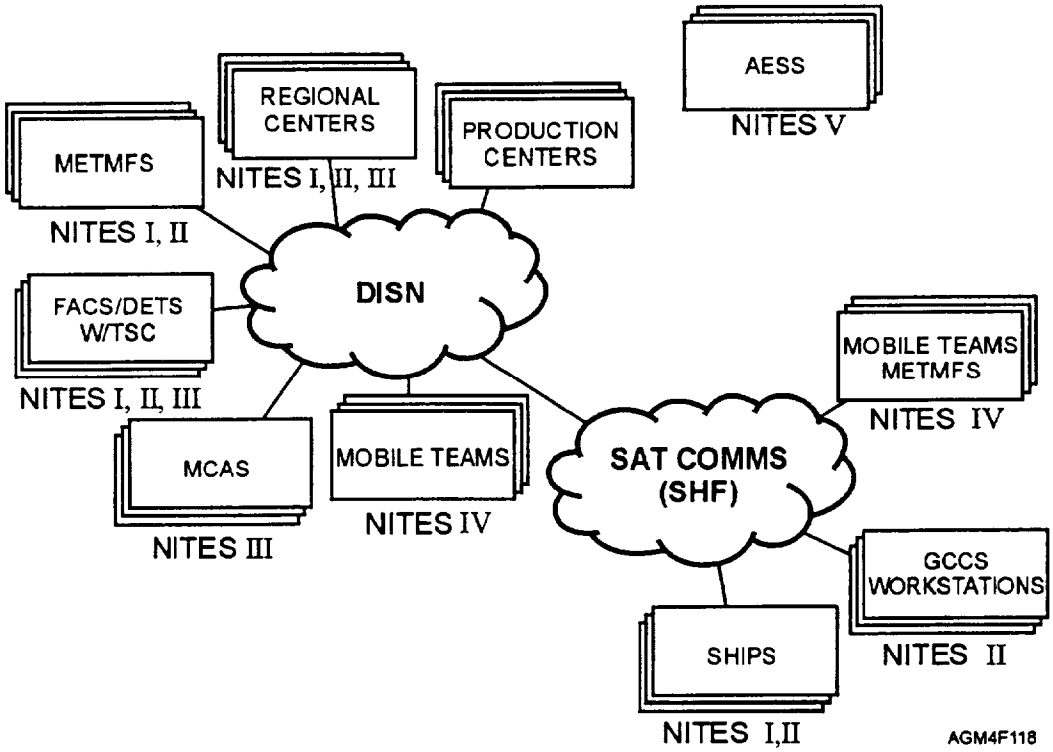


Figure 1-18.—Concept of NITES I through V supporting METOC sites.

portable environmental system tailored to mobile METOC support that includes members of mobile teams and Marine Corps mobile support units. This system will ultimately replace the Interim Mobile Oceanography Support System (IMOSS). NITES V is the Allied Environmental Support System (AESS).

INTERIM MOBILE OCEANOGRAPHIC SUPPORT SYSTEM (IMOSS)

The Interim Mobile Oceanography Support System (IMOSS) is a modular, rapid-response, on-scene environmental prediction computer system. It is a lightweight system based on network technology and laptop computers. IMOSS is primarily used by Navy Mobile Environmental Team (MET) members and Marine Corps Meteorological Mobile Facility (METMF) members. This system can store, analyze, and process meteorological and oceanographic information and produce numerous METOC application products.

System Configuration

The IMOSS consists of three sub-systems: the main subsystem, the communication sub-system, and the satellite sub-system. Each sub-system can be used as a stand-alone system, depending upon mission requirements. Network Interface Cards (NIC) included in each sub-system allow them to be networked together for easy tile transfer and data communications. The ability to network also allows the IMOSS user to tie into Local Area Networks or Wide Area Networks to obtain products and data from remote sources. Details on IMOSS as well as instructions for LAN and WAN connectivity can be found in the *Interim Mobile Oceanography Support System (IMOSS) Users Guide*, published by the Naval Oceanographic Office and delivered with each system. Figure 1-19 shows the basic IMOSS LAN configuration.

Main Module

The main module is designed to be used primarily for briefing support and the production of products from the GFMPL suite of software. The main module consists of a laptop computer, a classified, removable hard drive, and network interface devices. The current laptop computers include either an IBM 760EL(U4G) Thinkpad or a NEC VERSA 6030H Notebook. Both have a 133MHz Pentium processor, CD-ROM drive, and floppy drive capacity. These systems run using the Microsoft NT operating system and are loaded with Microsoft Office. Older systems operate on an IBM

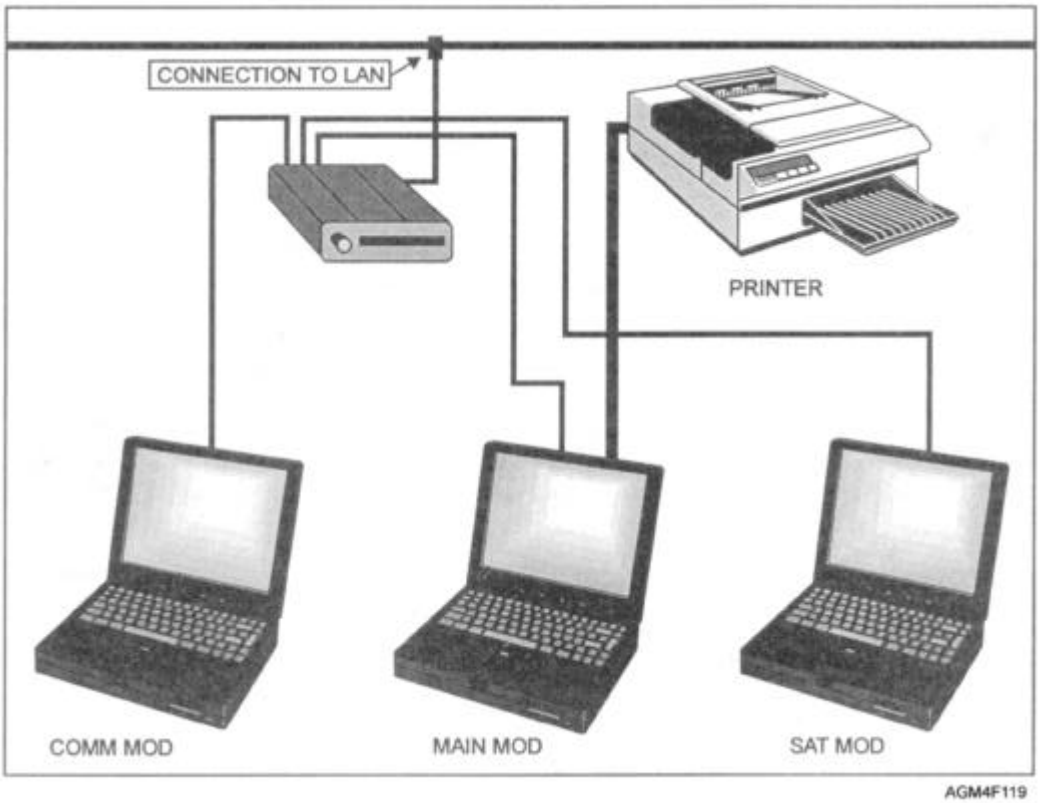


Figure 1-19.—Basic IMOSS LAN configuration.

755CD Thinkpad, which uses a 486DX4 100 MHz processor and the Windows 3.11 operating system. All components are packed in ruggedized cases.

The GFMPL software is loaded via CD-ROM. Both a classified and an unclassified version are available. GFMPL provides four basic functions: environmental data assimilation, environmental data analysis, sensor detection range and coverage predictions, and data file maintenance. GFMPL will be discussed in detail in chapter 2 of this module. Keep in mind that when the classified version of GFMPL is operating with any of the IMOSS computers, that computer, as well as any other attached devices or networks, must be classified at the appropriate level. When using the IMOSS in a network, you must take precaution to ensure that classified data is not inadvertently transmitted or made available to unauthorized sources.

Communications Module

The purpose of the communications module (COMM MOD) is to receive alphanumeric weather data and facsimile broadcast data via the HF receiver or satellite (fleet environmental broadcast data) using shipboard communications facilities. The receiver of the module has the capability to connect to the host ship's antenna system or be deployed independently with its own antenna. Currently, the communications sub-system consists of either an IBM 760EL (model U6F) or an NEC VERSA 2430CD notebook computer. The system also consists of a Kenwood R-5000 HF radio receiver or a Drake R8A communications receiver. It also includes a Dymek DA100D Tuner/Power supply receiving antenna and/or a Dymek DA 100E all-wave receiving antenna and various interface devices.

The Weather Fax system for Windows (version 3.0) is a software program that is preconfigured to run on the COMM MOD. It works with Windows NT and can operate even while other programs are running. Weather Fax is used to copy HF facsimile products and requires that a demodulator be used to interface with the HF receiver. The program can be used to tune the receiver and format a facsimile reception schedule. A Weather Fax scheduler database allows you to browse through selected world weather fax stations and schedules. The COMM MOD can also be configured to receive RATT (Radio Teletype) directly from a shipboard patch panel. RATT data is basically AWN data received from the Fleet Environmental Broadcast. RATT data can be saved in an ASCII format. Detailed setup and operating instructions for the COMM MOD are contained in the IMOSS *Users Guide.*

Satellite Module

The purpose of the satellite module (SAT MOD) is to receive, store, and display data from meteorological satellites. Like the communications module, the satellite module is another separate laptop computer that is packaged in a separate ruggedized case. Automatic Picture Transmissions (APT) data from polar-orbiting satellites, as well as WEFAX imagery from geostationary satellites, can be received depending on the antenna selected. The received data is ingested and managed by software known as WEATHERTRAC. The SAT MOD can be linked to the COMM MOD and to the main MOD to provide data transfer and briefing support, or it may be deployed independently. The satellite module is discussed in detail in chapter 1 of module 3. Setup and operating instructions are contained in the IMOSS *Users Guide.*

REVIEW QUESTIONS

Q37. What is the main function of TESS?

Q38. What is the major difference between older versions of TESS and TESS-NC Transition?

Q39. The TESS-NC Unix-based workstation is used for what purpose?

Q40. How many environmental subsystems does the NITES incorporate?

Q41. IMOSS is primarily designed for what segment of METOC support?

Q42. Which module of IMOSS is designed primarily to run GFMPL?

Q43. What is the purpose of the IMOSS communications module?

Q44. What type of satellite data can be copied by using the Satellite Module?

SATELLITE AND HIGH-FREQUENCY FLEET BROADCASTS

LEARNING OBJECTIVES: Recognize the various SHF satellite and HF radio broadcast systems used to transfer environmental information to ships and mobile environmental teams, Identify the publication that lists HF radio environmental broadcast channels. Describe HF facsimile receiver equipment used by Aerographer's Mates.

In this section, we will discuss the various super-high-frequency (SHF) satellite and high-frequency (HF) radio environmental broadcasts that are available to Aerographer's Mates stationed aboard ship or assigned to mobile teams. We will also discuss HF facsimile receiver equipment.

FLEET MULTI-CHANNEL BROADCAST (FMCB)

Shipboard Aerographer's Mates routinely send all observations and forecasts from their ship to other units via AUTODIN. They also receive and send a number of administrative messages via AUTODIN channels during normal operations. The bulk of incoming meteorological and oceanographic data is received on a satellite broadcast known as the Fleet Environmental Broadcast. Both AUTODIN and the Fleet Environmental Broadcast are transmitted to ships via SHF satellite as part of a secure communications system known as the Fleet Multi-channel Broadcast (FMCB).

Unclassified information from the AWN is forwarded to selected naval communication stations for broadcast via satellite. Each Naval Meteorology and Oceanography regional center monitors the environmental broadcast for their AOR (see table 1-5). The contents of each broadcast are also determined by each regional center. Normally, any data available in the AWN may be included on the environmental broadcast. However, because of the limitations of the system, only selected data are actually included. The regional centers may send a command via an AFMEDS terminal to halt the stream of data sent by the AWN. During these halts, classified traffic is transmitted by the regional center to the communications station for retransmission directly on the environmental broadcast. This classified data typically consists of naval ship observations and forecaster meteorological assistance support (MET Assists).

Specific requests for observations or forecasts not included in the broadcast are sent via message to the Fleet CINC and the responsible regional center with an information copy to COMNAVMETOCCOM, as specified in NAVMETOCCOMINST 3140.1. Your LCPO or MET Officer will normally initiate these requests.

The content of the environmental broadcast, as well as the channel assignments and the actual communications satellite itself, shifts when naval ships transit from one operational command area to another. Ships usually encounter these shifts when transiting from the Atlantic into the Mediterranean, from the Red Sea into the Arabian Sea, and through the Panama Canal.

The FMCB is normally transmitted in encrypted form. Aboard ship, the Radiomen operate and monitor the FMCB receiving equipment and crypto equipment. The decrypted data stream from the Fleet Environmental Broadcast is transferred to the shipboard weather office on a protected circuit. In the weather office, the data may be directed to a TESS or IMOSS terminal, or directly to a printer.

Other channels of the FMCB support AUTODIN message service and tactical data that supports systems, such as the Joint Operations Tactical System (JOTS), the Officer-in-Tactical Command Information Exchange System (OTCIXS), or the Tactical Data Information Exchange System (TADIXS). Many environmental products are composed specifically for these systems. The JOTS system in particular is extensively used by USN MET and USMC METMF members when embarked aboard ships without a weather office. The shipboard Aerographer's Mate normally has no responsibility to operate the shipboard receiving equipment for the JOTS, OTCIXS, or TADIXS broadcasts.

HIGH FREQUENCY (HF) BROADCASTS

Many meteorological and oceanographic data broadcasts containing either alphanumeric or graphic (facsimile) information are available for ships at sea from HF radio transmissions in different parts of the world. In the past, the National Weather Service, the U.S. Air Force, and NAVMETOC regional centers transmitted a continuous HF broadcast of meteorological data. Due to the high maintenance cost and advancements in communication technology, most of these broadcasts have been reduced or have been eliminated altogether.

Table 1-5.—Fleet Environmental Broadcasts Monitored by NAVMETOCCOM Regional Centers

NAVMETOCCOM CENTER	BROADCASTS MONITORED
NLMOC Norfolk (2nd Fleet)	East Atlantic: LMHA West Atlantic: LMHB NATO: H52N
NEMOC Rota (6th Fleet)	Mediterranean: MMHH
NPMOC Pearl Harbor (3rd Fleet)	East Pacific: PMOO
NPMOC WEST Guam (5th/7th Fleet)	West Pacific: PMHH Indian Ocean: MMWW

Air Force High Frequency Regional Broadcasts

In the late 1980s, with the loss of the NWS meteorological alphanumeric and facsimile HF radio broadcasts, the Air Force initiated a High Frequency Regional Broadcast (HFRB) program to transmit alphanumeric information from the AWN and graphic products from AFWA on several regional broadcasts. These broadcasts are available and compatible with Navy shipboard receivers. Either alphanumeric or graphic data may be directed to the TESS or IMOSS systems. Alternatively, alphanumeric data may be directed through a converter to a shipboard teleprinter, and the graphic data directed to a facsimile recorder.

These broadcasts carry AFWA regional graphic products on the upper sideband of the listed frequency and AFMEDS alphanumeric regional information on the lower sideband of the frequency. Broadcast frequencies and transmission times are available from the *Worldwide Marine Radiofacsimile Broadcast Schedules* published by the Department of Commerce/NOAA. This publication lists worldwide transmissions of meteorological and oceanographic products. Few observational data broadcasts are listed since these are not designed for use by the average mariner. Products are listed by the scheduled UTC transmission time of the product. HFRB sites broadcast only one frequency at any given time with routine frequency shifts at sunrise and sunset at the transmitter site. The broadcast is normally unencrypted, but may be encrypted for special Air Force support. When tuning a receiver to copy the sideband transmissions, you must tune your receiver 1.9 kHz higher than the listed frequency for an upper sideband (USB) signal and 1.9 kHz lower for a lower sideband (LSB) signal.

There are three active HFRB broadcast sites currently operational: a United States HFRB site at Elkhorn, Nebraska; a European HFRB site at Croughton, England; and a Caribbean and Central American HFRB site at Roosevelt Roads, Puerto Rico.

U.S. Navy Fleet Broadcasts

NAVMETOC regional centers still have HF facsimile broadcast capability that may be used as a backup source for meteorological data aboard ship. Navy Mobile Environmental Teams and Marine Corps METMF van sites may copy HF broadcasts as their primary data source when routine fleet meteorological communications are not available. However, these HF broadcasts are activated on a contingency-on-request basis only. Special request for activation of a particular HF broadcast must be sent to the appropriate NAVMETOC regional center.

The content of the HF broadcast is controlled by each NAVMETOCCOM regional center to provide support for U.S. Navy units operating within their AOR. Most products are computer-generated graphics of surface and upper-air analysis and forecast products. The data signals for the graphic products are sent from the regional centers to naval communications stations via landline. The communications station then transmits the signal on HF radio. Transmission frequencies and the broadcast time of each particular product are available by mail from each regional center, and are also included as part of the broadcast.

U.S. Coast Guard Facsimile Broadcast

The U.S. Coast Guard transmits a high-frequency facsimile broadcast of National Weather Service charts and satellite imagery. Broadcast stations include San Francisco, New Orleans, Boston, and Kodiak. Schedules and frequencies are available via the Internet. As with other HF meteorological transmissions, a listing of broadcast frequencies is available in the latest edition of *Worldwide Marine Radiofacsimile Broadcast Schedules.*

Foreign HF Broadcasts

Many meteorological and oceanographic data broadcasts containing either radio teletype or facsimile information are also available by copying HF radio transmissions from different countries of the world. U.S. Navy ships conducting an exercise or operation in a particular area may require more detailed meteorological information than is available on the Fleet Environmental Broadcast or regular military HF facsimile broadcasts. You may have to tune into a foreign HF radio meteorological broadcast and copy all of the information that country is willing to share with the rest of the world.

Two publications are very useful in determining the frequency and content of the various indigenous broadcasts. We have already mentioned the *Worldwide Marine Radiofacsimile Broadcast Schedules* publication. Another useful publication for meteorological or oceanographic data collection is Air Force Manual 100-1, *Global Weather Intercepts.* A portion of this publication lists meteorological broadcast frequencies and transmission times grouped according to the type of broadcast-continuous wave (CW), RATT, or facsimile-region, country, and transmitter site.

HF Facsimile Recorders

As a weather observer, you may be tasked to copy HF facsimile products by using miniaturized facsimile (minifax) recorders. Normally, several different frequencies are available for each HF broadcast station. A few of these frequencies are available 24 hours per day. You must monitor the signal to ensure that usable quality graphics are produced. Due to daily changes in atmospheric conditions, you will find that lower broadcast frequencies provide a better signal at night, while higher broadcast frequencies provide a better signal during the day.

Most U.S. originated HF radio analog signal facsimile transmissions include a marking tone at the beginning of each line of the image. This marking *tone* is automatically interpreted by the recorder to indicate a new line of image, and the recorder automatically aligns each line properly to form the image. Some foreign facsimile transmissions do not contain a recognizable marking tone, which results in a skewed image where each line of the image is offset an inch or two to the right or left. Manually setting the recorder LPM-setting to match the transmission LPM setting normally corrects the skew. Common settings used are 60-, 90-, 120-, or 240-lines-per-minute.

Two models of minifax's are in use by Navy MET and Marine Corps METMF units: the 9315 series TR4 and the TRT models. Both are equipped with a 5-foot whip antenna and preamplifier for *use* aboard ship or ashore. Aboard ship, the ship's antenna system may be connected to the recorder instead of the 5-foot whip.

The Alden 9315 series facsimile receiver/recorders contain a digital receiver and use dry, thermally sensitive 1 l-inch-wide rolls of paper. Replacement rolls of paper are inserted through the top of the equipment following instructions provided inside the paper compartment. A forward and reverse scanning thermal print head is used instead of a stylus on a belt. You must be very careful when feeding the paper through the roller system to avoid damaging the thermal print head.

ALDEN 9315 TR4.—This minifax is widely used by mobile teams. The TR4 model can copy facsimile transmissions received over the internal receiver, over an external radio, or over the telephone. AM voice broadcasts and CW may be monitored on a speaker. A 9315 TR4 is shown in figure l-20.

ALDEN 9315 TRT.—Although the TRT model looks nearly identical to the TR4 model, it is much more than a facsimile receiver/recorder. The 9315 TRT has a

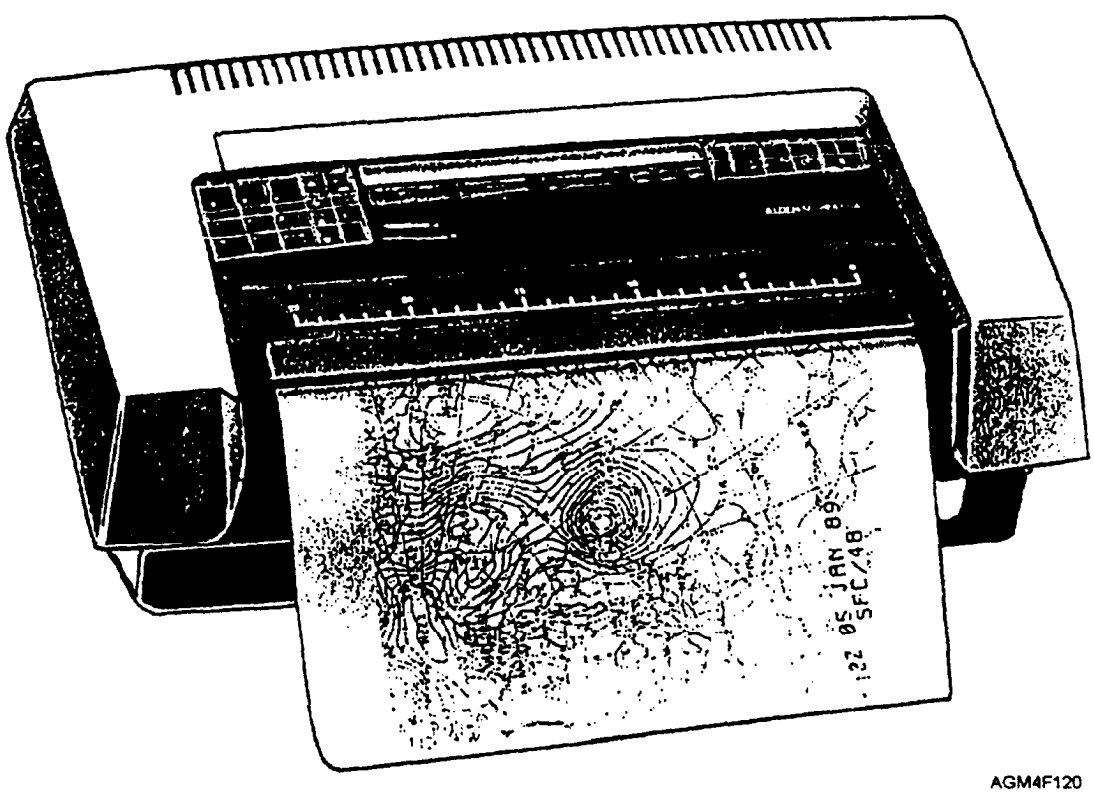


Figure 1-20.—Alden 9315 series TR4 model facsimile receiver/recorder.

built in signal converter in addition to the receiver. The equipment is capable of printing digital facsimile graphics, HF radioteletype, and CW decoded from International Morse Code into alphanumeric characters. Other than tuning the proper radio frequency and setting the AM/USB/LSB/FM switch, no additional operator inputs are necessary to print alphanumeric data, graphics, or imagery.

For use ashore, an optional long-wire antenna or the whip antenna may be used. The long-wire antenna has two very long lengths ofreinforced wire extending from a central connection point. Although this antenna receives signals very well, it must be lowered from its installed location and tuned by shortening or lengthening the two wires for each different frequency range. Frequency range markings are provided on each wire. Detailed instructions are provided in an instruction booklet supplied with each long-wire antenna.

REVIEW QUESTIONS

Q45. How is the Fleet Environmental Broadcast and AUTODIN traffic relayed to ships at sea?

Q46. Which NAVMETOC regional center is responsible for the Sixth Fleet Environmental Broadcast?

Q47. What type of data is included in the Fleet Environmental Broadcast?

Q48. Which agency maintains high frequency regional broadcasts (HFRB)?

Q49. What is the purpose of the HF facsimile broadcastfrom NAVMETOC regional centers?

Q50. Which publication contains listings of frequencies for HF RATT and facsimile transmissions?

Q51. What level of HF frequencies should be copied at night?

Q52. Which type of facsimile recorder is the most widely used by mobile environmental teams?

SHIPBOARD HF RADIOS

LEARNING OBJECTIVES: Identify the radio communications equipment routinely found in shipboard weather offices. Discuss the applications and use procedures for this equipment.

Aboard ship, weather observers may be tasked to operate special radio-receiving equipment to tune in local HF environmental broadcasts of alphanumeric or facsimile products. With the advent of TESS (3) and subsequent advancements in communications technology, copying an HF radio broadcast with this equipment is rarely necessary. In this section, we discuss some basic terms that you must be familiar with, basic shipboard radio receiving equipment you might use, and the information systems that are used aboard ships to receive environmental information.

The equipment you will use to receive I-IF radio transmissions aboard ship varies for the different types of broadcasts. Weather personnel are primarily concerned with receiving voice broadcasts, Radioteletype (RATT) broadcasts, and facsimile broadcasts. To receive a radio voice broadcast, all you need is an antenna, a radio receiver, and a speaker. On most ships, these are all separate pieces of equipment. To copy a facsimile broadcast, you will need to patch the output from the radio receiver into a facsimile recorder. Finally, to receive a RATT broadcast, you will need to patch the output from the radio receiver into a signal converter, then patch the converter output into a teleprinter. Aboard ship, antenna patch panels and transfer switchboards are used to connect various pieces of equipment.

HF ANTENNAS

Aerographer's Mates and Marine Corps observers use antennas both ashore and shipboard to receive HF radio transmissions of weather information and satellite broadcasts. Fortunately, many of the meteorological or oceanographic data reception systems in use have been simplified so that the antenna that is supplied with the system matches the frequencies desired. Aboard ship, antenna usage is controlled by the Radiomen in the communications spaces. Before attempting to tune in a

frequency, consult with the duty radiomen for the best available antenna to use to receive the desired broadcast. Aboard CVs, LHAs and LHDs, several shipboard antennas may be dedicated for use by the weather office. When dedicated antennas are present, one or more AN/SRA-12 antenna patch panels will be located within the Met Office (fig. 1-21).

On the AN/SRA-12, the top row of jacks may contain plug connections to either antennas or receiver sets. In figure l-21, two antennas are available: INT ANT-2 and a LONG WIRE; and four radio receivers: R-2368 No.5, No.6, No.7, and No.8. The lower portion of the panel contains an antenna-input patch (on the far-left side), and four patches for each of the seven filtered frequency ranges varying from 32 MHz down to 14 kHz. ANT-2 has been selected as the input antenna and connected to the input jack. R-2368 No.5 has been patched to the filtered antenna output in the 32 MHz to 14 MHz range.

NOTE: When patching, you must always insert the end of the antenna patch cord into the receiver first, and then into the lowest usable filtered frequency patch. When unpatching, remove the receiver jack first, and then the filtered frequency patch. Patch or unpatch from the top down.

More than one receiver may be connected to the same antenna. For instance, receiver No.6 may be connected by use of an additional patch cord to another jack on the filtered 32 MHz to 14 MHz output or to another frequency range.

RADIO RECEIVERS

There are two basic types of radio receivers found in shipboard meteorological offices: the R-1051/URR receiver and the newer R-2368/URR. The R-2368/URR is currently being installed in all new construction ships, and is being retrofitted to older ships to replace both the R-1051/URR medium- and high-frequency receivers and AN/WRR-3 low-frequency receivers.

R-1051/URR Receiver

The R-1051/URR receiver (fig. 1-22) receives CW, AM, USB, LSB, and ISB signals, plus frequency-shift keying (FSK) signals in the 2-MHz to 30-MHz range. Frequency settings are dialed into the windows on the front panel. This receiver is a very reliable receiver and is very easy to operate. Operator instructions and very simple operator maintenance procedures are contained in the operator's manual for the R-1051(B), (C), or (D)/URR Receiver.

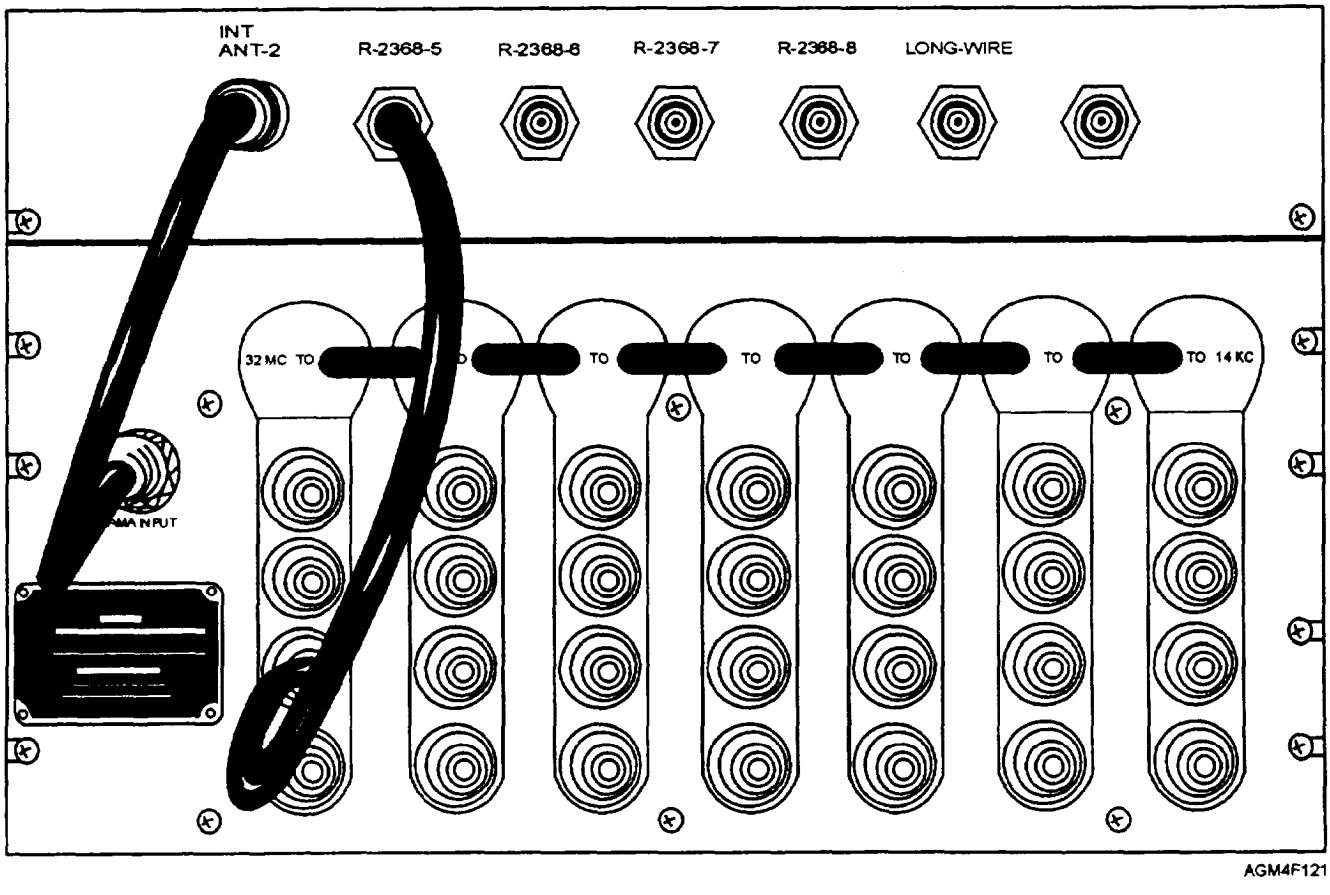


Figure 1-21.—AN/SRA-12 antenna filter and receiver antenna patch panel.

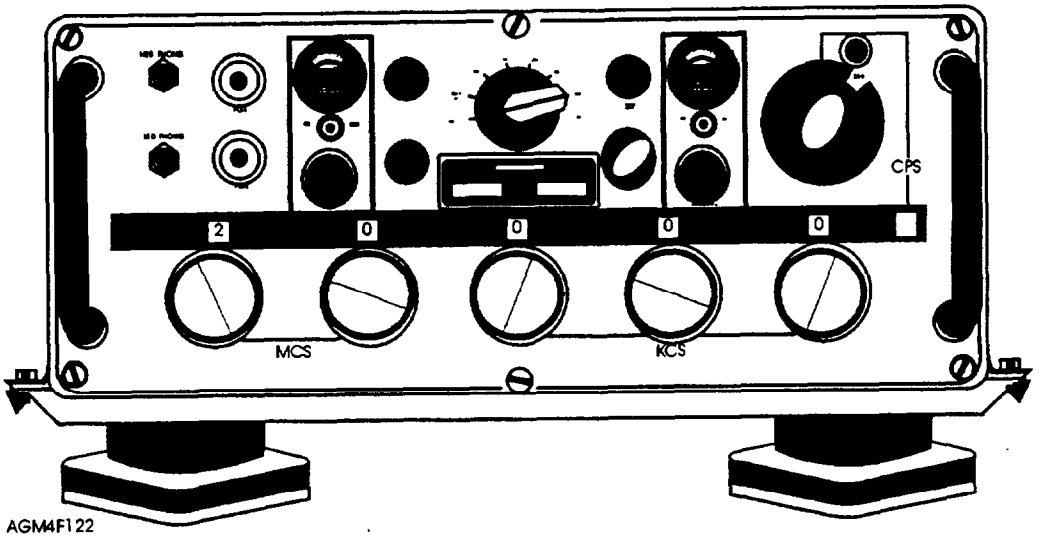
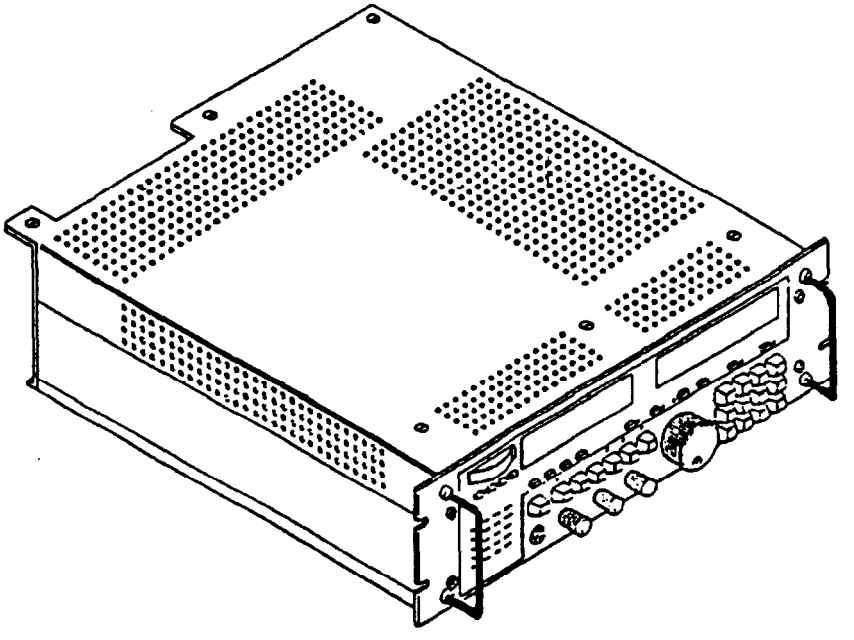


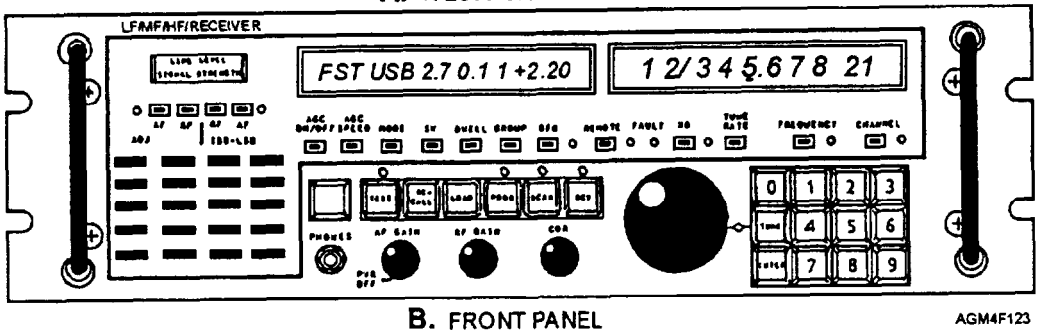
Figure 1-22.—R-1051(B)NRR receiver.

R-2368/URR Receiver

Figure 1-23, view A, shows the R-2368/URR receiver ready for mounting in an equipment cabinet; view B shows the front panel. The R-, medium-, and high-frequency communications. The equipment is capable of receiving in the USB, LSB, ISB, AM, FM, and CW modes. It has a unique frequency-



A. R-2368/URR RECEIVER



B. FRONT PANEL

Figure 1-23.—R-2368/URR receiver.

programming feature that can store up to 100 preprogrammed frequencies. A keypad is used to key in frequencies either for use or program storage. The receiver may scan any or all of the preprogrammed frequencies to check for traffic on the frequency.

Operator maintenance is limited to scheduled cleaning, visual inspection, and initiating a periodic self-test routine. No special training or equipment is required. The front panel should be checked once a day for display of a fault condition to ensure that there is no internal circuitry failure. Details of these operator maintenance procedures, as well as easy to follow operator instructions, are contained in *Technical Manual Operation and Maintenance Instructions with Parts List, Receiver R-2368/URR,* EE125-FC-OMI-010/R-2368/URR.

RECEIVER SWITCHBOARD

The receiver transfer switchboard allows you to transfer the audio output from the receivers to remote control station audio circuits. Figure 1-24 shows two representative SB-973/SRT receiver transfer switchboards. These switchboards contain ten 7-position switches. Each switch is connected to a remote station, such as a facsimile recorder, the TESS input jack, or an audio speaker. Each of switch positions 1 through 5 relates to a receiver, which is usually specified on an engraved plate along the top of the switch case. In figure 1-24, only the first four switches of each switchboard have been used, as seen by the engraved equipment identification adjacent to each switch. The position "x" on each switch allows you to transfer the circuits to additional switchboards.

AN/URA-17 COMPARATOR-CONVERTER

A comparator-converter device is used to convert a radio receiver's frequency shift keying audio output carrying radioteletype information into direct current (dc) pulses compatible with a teleprinter. The comparator-converters currently used aboard Navy ships are the AN/URA-17(B) or (C) versions (fig. 1-25). A group consists of two CV-483/URA-17 frequency shift converters cross connected with a wiring harness. The output of each CV-483 is hardwired into receiver transfer switchboards, and usually identified as URA-17 "A" for the top converter, and as AN/URA-17 "B" for the bottom unit.

Two converters are supplied so that the user may tune in the same radioteletype broadcast on two separate frequencies with two radio receivers, and feed the output from both converters into the same printer. This method of copying a radioteletype broadcast is

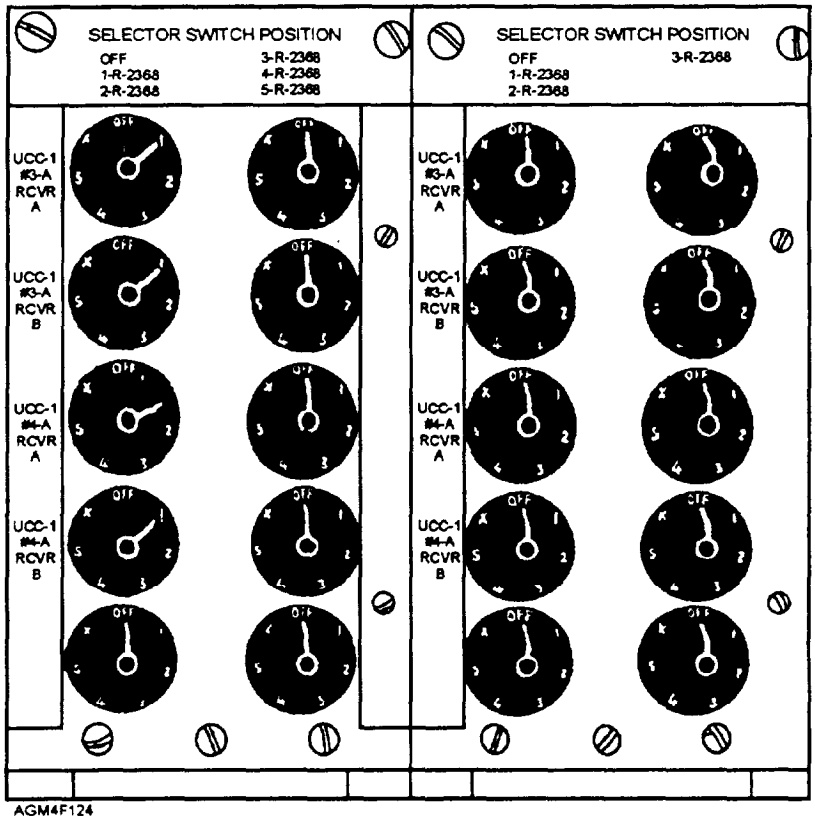


Figure 1-24.—SB-973/SRT receiver transfer switchboards.

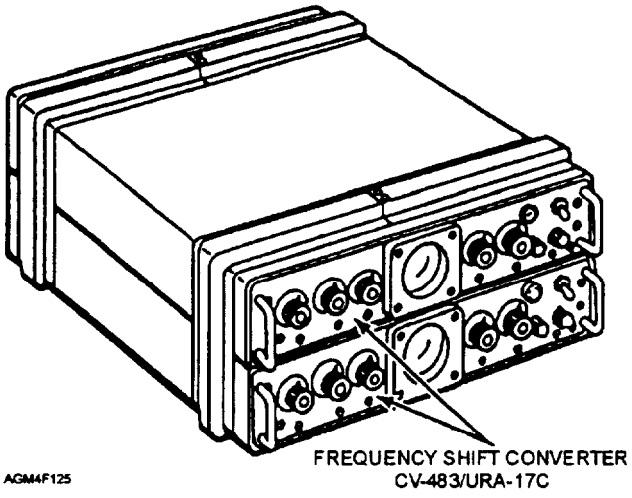


Figure 1-25.—Comparator-Converter group AN/URA-17(C).

called *diversity*. When the URA-17 is operating in diversity mode, the signal comparator circuits in the equipment compare' the signal strength and clarity of each received signal, and allow only the better signal to be routed to a printer.

Each converter may also be used independently. When you operate a CV-483 in the single mode, the comparator circuits are not used. Separate radioteletype broadcasts may be routed through each converter and sent out to separate printers. Operation of each individual CV-483 is not difficult. Operator controls are all on the front of the unit (fig. 1-26).

In order to successfully copy RATT data, you must complete the following steps:

1. Using switchboards and antenna patch panels, connect an appropriate antenna to your receiver(s), and then connect your receiver(s) to the CV-483(s). Optionally, you may also patch radio output to an audio speaker. A RATT signal has a distinctive sound. With experience, you may be able to properly tune a RATT signal by sound alone.

2. Turn the power on with the power switch, and then place the function switch to the "tune" position.

3. Then tune a radio receiver to a listed radioteletype frequency. You may have to tune to 1.5 to 1.9 kHz above or below the actual listed frequency if copying sideband transmissions. The wave pattern in the cathode-ray tube window is used to properly adjust the signal.

A properly tuned signal should appear as an "X" pattern centered on the middle lines inscribed on the CRT window (fig. 1-27, view A). If the pattern is shifted above the bottom inscribed line (view B), the radio frequency needs to be lowered slightly. If the pattern is shifted below the top inscribed line (view C), the radio frequency needs to be raised slightly.

When the "X" pattern is centered, but the top and bottom pattern lines do not touch the top and bottom lines inscribed on the CRT (view D), the CV-483 "level" control must be increased. If the "X" pattern extends both above and below the top and bottom inscribed lines (view E), the "level" must be decreased.

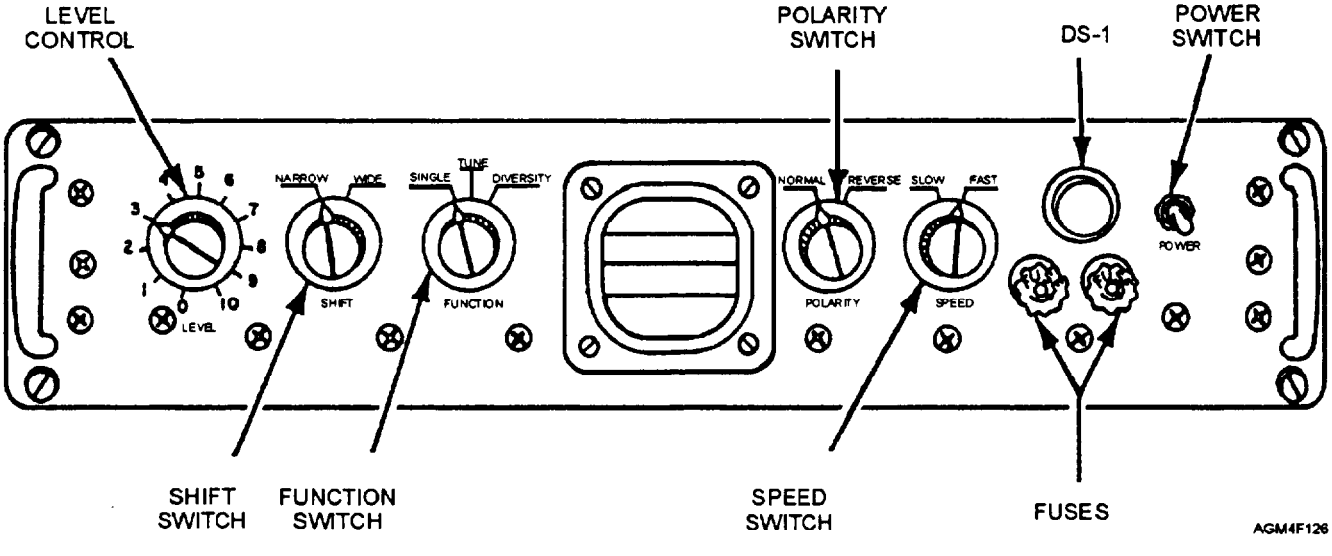
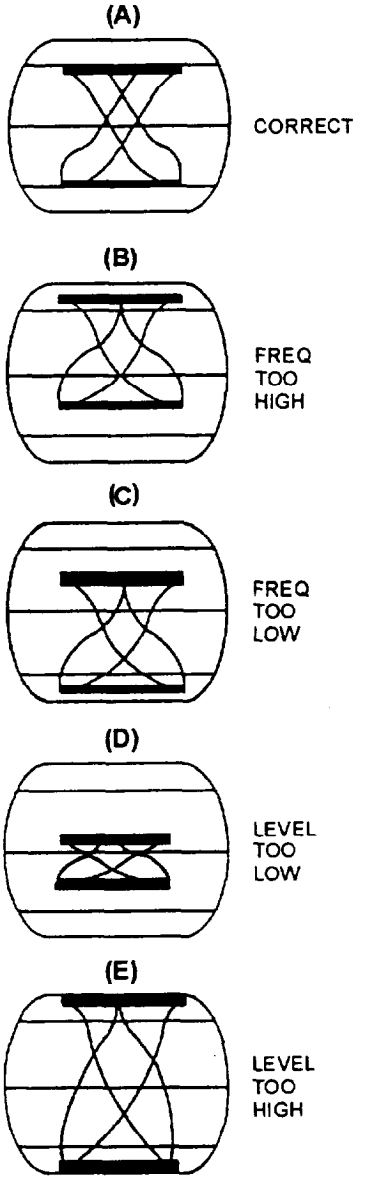


Figure 1-26.—Frequency Shift Converter CV-483/URA-17 front panel controls.



CV-483 CRT SIGNAL PATTERNS. VIEW (A) SHOWS A PROPERLY TUNED SIGNAL, VIEW (B) FREQUENCY IS TOO HIGH, VIEW (C) FREQUENCY IS TOO LOW, VIEW (D) THE CV-483 LEVEL IS TOO LOW, AND VIEW (E) THE CV-483 LEVEL IS TOO HIGH.
AGM4F127

Figure 1-27.—CV-483 CRT signal patterns. View (A) shows a properly tuned signal, view (B) frequency is too high, view (C) frequency is too low, view (D) the CV-483 level is too low, and view (E) the CV-483 level is too high.

Table 1-6.—CV-483 Speed Setting Compared to RATT Baud Rate and Printer Word-Per-Minute Settings

SLOW	45.5 BAUD	60 WPM
	55 BAUD	75 WPM
FAST	75 BAUD	100 WPM

4. Using the transfer switchboard, you may now connect the CV-483(s) to a teleprinter or TESS HF RATT input and switch the CV-483 function switch to the "single" setting. If the printer appears to be printing garbled letters and numbers, switch the "polarity" switch to the "reverse" position. If still printing garble, adjust the "speed" switch to "slow" and adjust the printer Words Per Minute (WPM) or Baud rate setting. *Baud is* the rate of modulation of a transmitted signal. The words-per-minute figure is an approximation based on the relationship that one word is six-unit characters of information. Baud rate times 1.35 is the approximate WPM rate. The CV-483 speed is related to transmission baud rates and WPM rates, as shown in table 1-6.

SHIPBOARD TELEPRINTERS

Observers in shipboard meteorological offices equipped with the TESS (3) or later versions of TESS may direct HP RATT signals into the TESS system for automatic sorting, storage, selected recall and display, or printing of alphanumeric information. IMOSS can also be used to copy RATT data. On ships not equipped with TESS or IMOSS, the incoming information must be directed to a printer. Currently, there are two basic types of shipboard teleprinters in use: the Teletype Corporation Model 28 (several different versions) and the Navy Standard Teleprinter (NST), the AN/UGC-143A(V).

Model 28 Teleprinter

The Teletype Corporation Model 28 teleprinter is a family of reliable low-speed teleprinters. Some versions are not equipped with a keyboard, and are known as *receive-only* (RO) teleprinters. Other versions have a keyboard and are known as *Keyboard Send-Receive* (KSR) teleprinters. In one version or another, Model 28 printers may still be found in shipboard meteorological offices. Some of the basic versions of the Model 28 are the TT-48/UG floor-mounted KSR teleprinter (fig. l-28), the TT-69/UG tabletop KSR teleprinter (fig. l-29), the AN/UGC-20 compact KSR teleprinter (fig. l-30), and the AN/UGC-25 compact RO teleprinter (fig. 1-31).

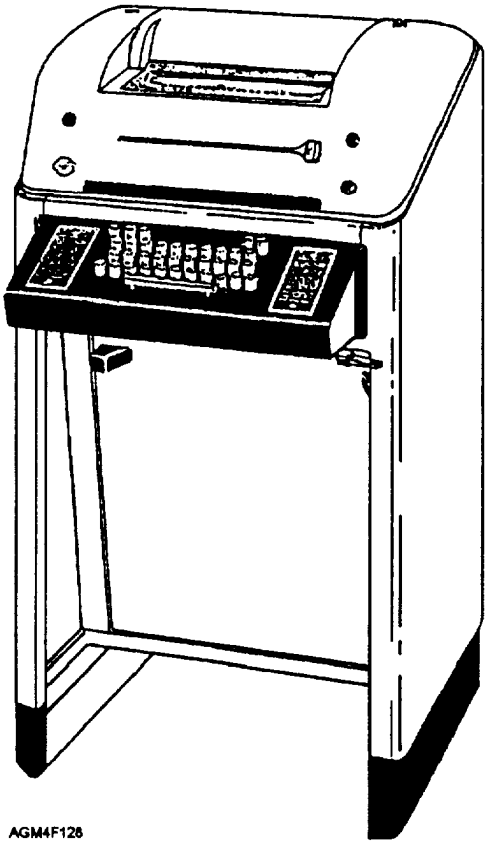


Figure 1-28.—TT-48/UG Model 28 floor-mounted KSR teleprinter.

All teletype Model 28 printers use rolls of paper, which are inserted into the printer through the top. The paper may be single copy (single ply) or have three layers of paper and two layers of carbon (5-ply). Various colors of paper are also available. Usually, only single-ply yellow is used in meteorological offices. Paper loading instructions are found inside the printer when the lid is opened.

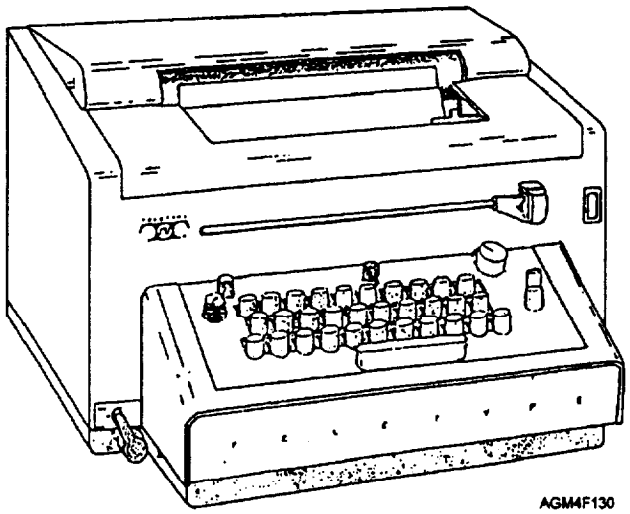


Figure 1-30.—AN/UGC-20 Model 28 compact KSR teleprinter.

These teleprinters use inked cloth ribbons, supplied on a single metal spool. Ribbon routing instructions are also listed inside the case. When installing a new ribbon, you must save one of the two used ribbon spools to attach to the new ribbon. Never reink and reuse old ribbons. Always replace them when the printing is very light or the ribbon shows signs of fraying or tearing, especially around the small metal eyelets near each end of the ribbon. These eyelets activate the ribbon-direction-reverse lever inside the teleprinter. If an eyelet tears loose from the ribbon, the reverse lever is not activated, and the ribbon advance gears or the ribbon mounting assembly may be damaged when the ribbon pulls taut.

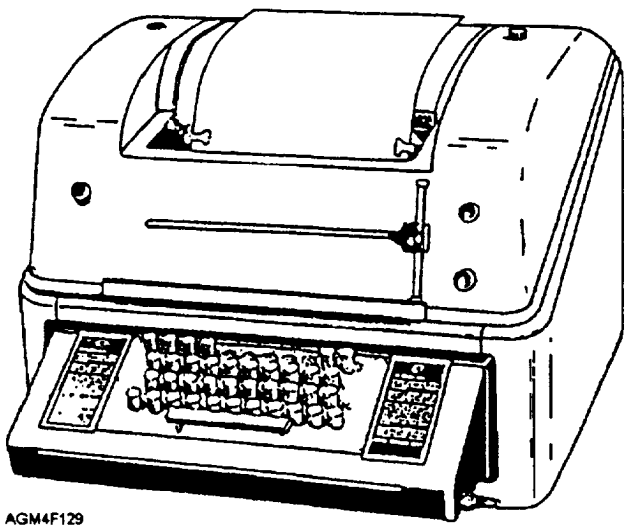


Figure 1-29.—TT-69/UG Model 28 tabletop KSR teleprinter.

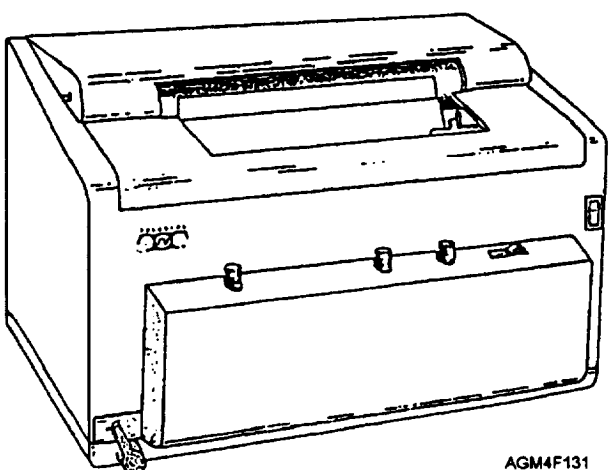


Figure 1-31.—AN/UGC-25 Model 28 compact RO teleprinter.

Printing speed on the TT-48 and TT-69 teleprinters is adjustable by changing gears, but is usually set at 100 WPM. One of your shipboard Radiomen trained in teletype repair and maintenance will change the gears if necessary. On the UGC-20 and UGC-25 teleprinters, a switch lever on the left lower front edge of the printer is used to change printing speeds between 60 WPM, 75 WPM, or 100 WPM. Turn the power off before switching speeds.

Navy Standard Teleprinter

The AN/UGC-143A(V) Navy Standard Teleprinters (NSTs) have replaced most of the Model 28 teleprinters. The NST is designed for shipboard (both surface and subsurface) and shore station applications.

The NST is a high-speed electronic teleprinter that automatically accepts and processes transmissions from 45.5 baud up to 9600 baud. It prints 120 characters per second (1200 WPM). It is composed of several modules selectively connected to form the various configurations (configurations are discussed shortly). The NST may be used either as a tabletop unit or slide-mounted in standard equipment racks.

There are four versions of the AN/UGC-143A Teleprinter: the AN/UGC-143A(V)l receive only-1 (RO1) teleprinter (fig. 1-32), AN/UGC-143A(V)2 receive only-2 (RO2) teleprinter (looks the same as an RO1), the AN/UGC-143A(V)3 keyboard send-receive (KSR) teleprinter (fig. 1-33), and the AN/UGC-143A(V)4 automatic send-receive (ASR) teleprinter (fig. 1-34). The various NST configurations consist of combinations of one or several modules, such as the electronic module, printer module, keyboard module, keyboard/display module, or the bulk storage module. All four configurations contain basic electronics and printer modules. Only the RO2 and the ASR teleprinters contain a bulk storage module. Of the two keyboard configurations, the KSR has a standard keyboard, while the ASR has a Liquid Crystal Diode (LCD) single line display window.

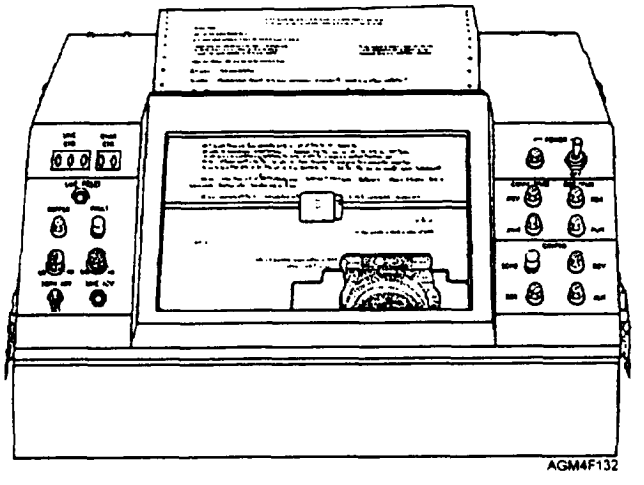


Figure 1-32.—AN/UGC-143A(V)l receive only-1 (RO1) teleprinter, or the AN/UGC-143A(V)2 receive only-2 (RO2) teleprinter.

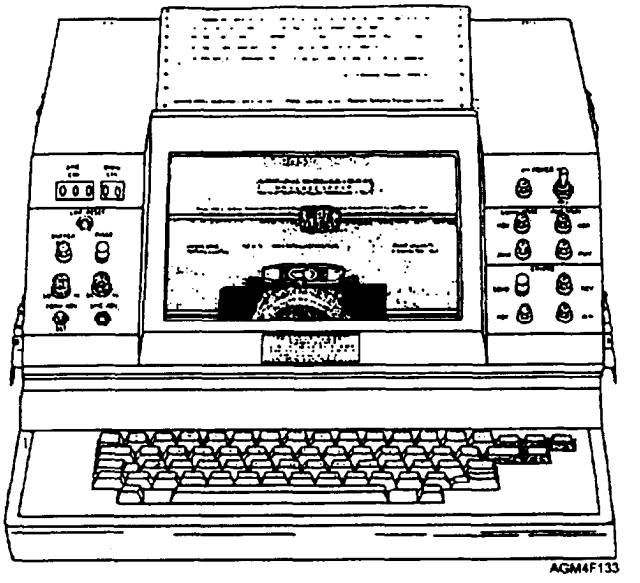


Figure 1-33.—AN/UGC-143A(V)3 keyboard send-receive (KSR) teleprinter.

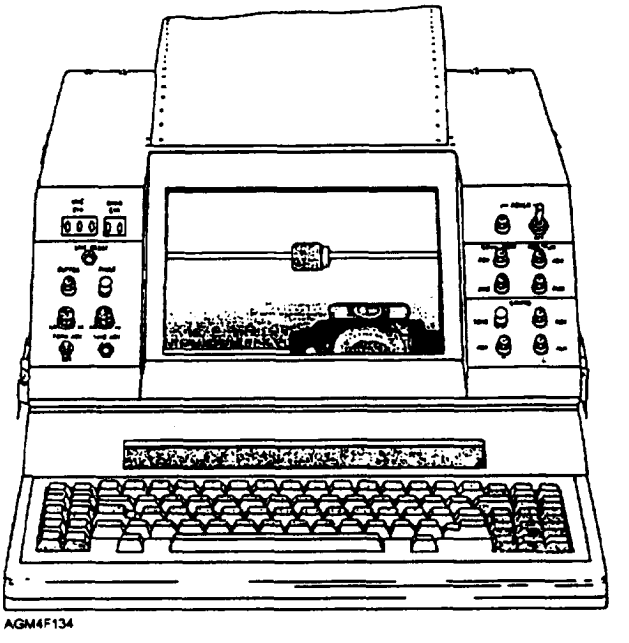


Figure 1-34.—AN/UGC-143A(4 automatic send-receive (ASR) teleprinter.

The electronic module controls the functional operations of the NST and provides temporary storage of all transmitted and received information. It contains a message buffer memory, message segmentation logic, message routing logic, communication port, crypto port, and power supply. The buffer compensates for varying baud rates and holds incoming traffic until the entire message has been received, and then sends it to the printer.

The printer module contains the printer mechanism, printer electronics, printer buffer, status indicator, system setup switches, and power supply. All received or transmitted information may be automatically printed. The operator can interrupt the printing mode without losing incoming message traffic to print directory information or internal systems test results. A dot-matrix print mechanism is capable of printing line lengths up to 80 characters at a speed of 120 characters per second (1200 WPM). (Until all Model 28 teleprinters have been replaced ashore and afloat, only 69 characters are allowed in a single message line.) Operator-selected, single- or double-line spacing modes are available. The printer uses either friction-feed nonperforated or tractor-feed perforated fan-fold paper. It is capable of accommodating single-ply paper or five-ply paper.

The keyboard module contains the basic complement of keys needed to send characters, release tape reader input, and perform tape editing. Another variation of the keyboard module includes a one-line (80-character) LCD display and special function keys that help the operator in message preparation and correction (fig. 1-35). The gray shaded keys are command or edit functions. Many of the remaining keys contain message functions, accessed by holding down the "shift" key as the function is depressed. Notice that the keyboard contains carriage return (CR), line feed, letters (LTRS), and figures (FIGS) keys, similar to the older Model 28 keyboards.

The bulk storage module contains the tape drive, drive electronics, message file logic, bulk storage buffer, function control switches, and power supply. It automatically stores all received and transmitted messages on a removable data cartridge. This module maintains an archive directory listing (table ofcontents) of all messages stored. The operator can have the table of contents printed or displayed on the keyboard module screen. The table of contents lists the messages in date-time group order and includes the originator, NAVCOMPARS processing sequence number (PSN), and an access number by which the operator can recall the message from storage. A data cartridge tape can store up to 1,344 messages of 2,000 characters each.

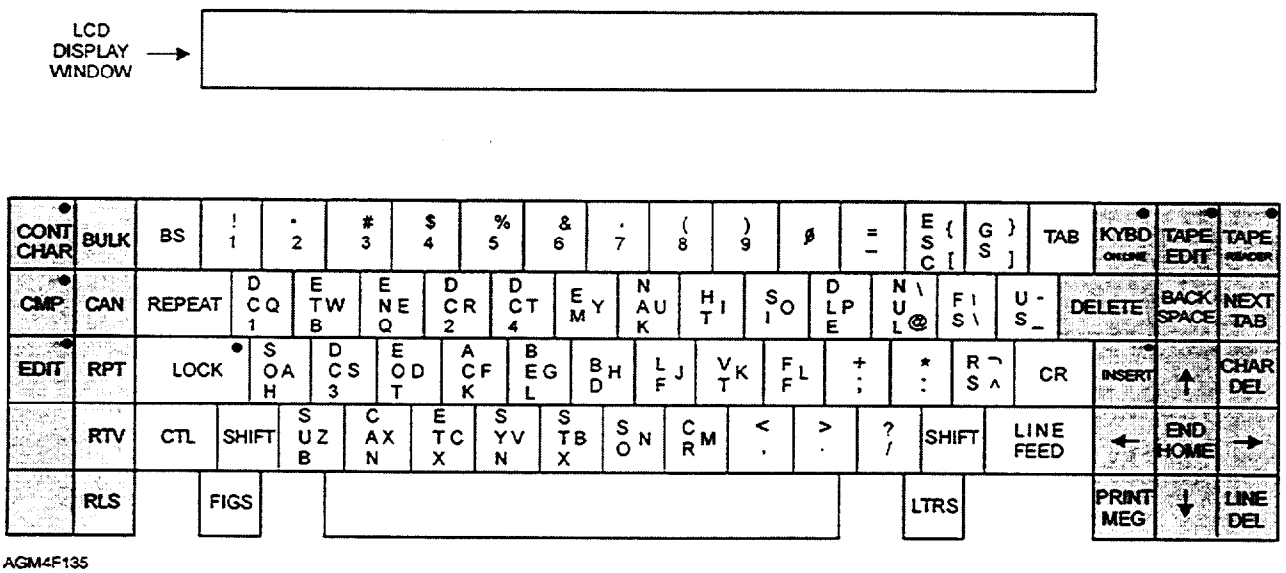


Figure 1-35.—AN/UGC-143A(V)4 ASR keyboard.

Operator maintenance on the equipment is limited to changing paper and printer ribbons. Instructions are provided on the inside of the printer case. Radiomen and Electronics Technicians perform all other maintenance.

Detailed operator instructions are contained in *Operator and Maintenance Instructions Teleprinter Set an/UGC-143A(Y).* Specific instructions on the use of special message function keys and composing messages for teletype (or radioteletype) transmission are contained in *Communications Instructions, Teletypewriter (Teleprinter) Procedures,* ACP-126.

REVIEW QUESTIONS

Q53. When patching antenna jacks on the AN/SRA-12, which patch must be connected first?

Q54. What are the two basic types of shipboard radio receivers?

Q55. How should a properly tuned signal appear on the CRT window of the CV-483/URA-I7 converter?

Q56. What are the two basic types of shipboard teleprinters in use?

SUMMARY

In this chapter, we have discussed many of the high-speed landline, satellite, and HP radio communications systems currently in use. We have also discussed much of the specialized equipment used as terminals on these communications systems. The specific communications systems and equipment available for use varies greatly from shore stations to ships. Although the systems currently in use are dramatically different and far more technologically advanced than the systems used only 10 years ago, we will see many more changes occurring as newer technology is introduced through early next century.

ANSWERS TO REVIEW QUESTIONS

A1. OPNAVINST 5510.1, Department of the Navy Information and Personnel Security Program Regulation.

A2. For Official Use Only.

A3. Not Releasable to Foreign Nationals.

A4. A record slip or log entry must be made. In addition, official authorization maybe required.

A5. The STU-III is a secure telephone system that provides protection of vital and sensitive information.

A6. Internet links allow a user to download another document into their computer simply by clicking on an on-screen "link" from the current document.

A7. Servers direct Internet traffic to its proper destination.

A8. The abbreviation ".MIL" will appear as an extension at the end of the URL.

A9. SIPRNET

A10. METOC-related military websites usually contain information on command history, mission, as well asprovide access to various environmental products.

A11. The individual's name and host identifier.

A12. The AWN is a system that collects and disseminates environmental data and other aviation-related information via satellite and landline circuits.

A13. FNMOD Tinker, Oklahoma.

A14. Automatic Response Query (ARQ).

A15. The TT indicator of a MANOP header is used to identify message content. The AA indicator is used to identify the region for which the data is valid.

A16. NOTAMS report items of interest to aviators, such as temporary or permanent runway closures, radar, communications, guidancesystem outages, or changes in facilities available at an airfield.

A17. DIFAX products are copied by using an 18-inch satellite dish antenna.

A18. MIDDS acts as an environmental workstation, a briefing station, and a method of distributing METOC products.

A19. The MIDDS Fusion Generator allows you to overlay various products using different backgrounds and color schemes. Alphanumeric products can also be fused with other geo-referenced products.

A20. The Dial RX receiver is used to acquire radar images from WSR-88D radar sites via a commercial dial-up service or the Internet. It can also be used to receive GOES satellite data, alphanumeric products, and DIFAX products.

A21. The SAND function is used to display Satellite, NEXRAD (WSR-88D), and DIFAX images. SAND gives the user the ability to manipulate and enhance these products.

A22. The FOS Module is an applications module used to display and manipulate alphanumeric data.

A23. Briefing Support.

A24. The ASOS Data Manager.

A25. Gateguard.

A26. Message Text Format (MTF) Editor.

A27. Telecommunications Users Manual, NTP 3.

A28. NAVMETOCCOMINST 3140.1.

A29. The electronic Distributed Plain Language Address Verification System (DPVS).

A30. The "NARR/" set identifier is used in a GENADMIN message when two or more references are listed in the message.

A31. Less than 10 years from the date of the message.

A32. Mission accomplishment and safety of life.

A33. PMSV radio is used to relay meteorological information between aircraft and airfield weather offices.

A34. I have received your signal, understand it, and will comply.

A35. Wind TWO-FIVE-ZERO degrees, ONE-SEVEN knots.

A36. Never relay the ship's name or position.

A37. TESS is a modular, interactive, computer-based system which collects, processes, analyzes, displays, and disseminates METOC data and products. It is primarily installed aboard ships.

A38. Internet access.

A39. The TESS-NC Unix-based workstation is used to access the Global Command and Communications System-Maritime (GCCS-M) and tactical decision aids.

A40. Five.

A41. Mobile Environmental Teams (MET) and Meteorological Mobile Facility (METMF) members.

A42. The main module.

A43. The purpose of the communications module is to receive alphanumeric weather data and facsimile broadcast data via HF receiver, or satellite broadcast via shipboard communication facilities.

A44. APT (polar-orbiting) and WEFAX (geostationary) imagery.

A45. AUTODIN and the Fleet Environmental Broadcast are relayed to ships via SHF satellite as part of the Fleet Multi-channel Broadcast (FMCB).

A46. NEMEOC Rota, Spain.

A47. Selected AWN data, classified ship observations, and MET-Assist messages.

A48. U.S. Air Force.

A49. HF broadcasts from NAVMETOC regional centers are primarily used as a backup source for meteorological data aboard ship when routine fleet communications are not available.

A50. Worldwide Marine Radiofacsimile Broadcast Schedules.

A51. Lower frequencies.

A52. TR4 minifax.

A53. Insert the patch cord into the receiver first.

A54. R-1051/URR and the R-2368/URR.

A55. An "X" pattern.

A56. The Teletype Corporation Model 28 and the Naval Standard Teleprinter (NST).